



# **STIC Search Report**

**EIC 1700**

**STIC Database Tracking Number: 223900**

**TO: Monique Wills**  
**Location: Remsen 6c21**  
**Art Unit : 1745**  
**May 14, 2007**  
**Phone: 571-272-1309**  
**Serial Number: 09 / 579576**

**From: Jan Delaval**

**Location: EIC 1700**  
**Remsen 4a30**  
**Phone: 571-272-2504**  
**jan.delaval@uspto.gov**

## **Search Notes**

**SEARCH REQUEST FORM**

Scientific and Technical Information Center

Inventor's Full Name: Monique Wills Examiner #: 76068 Date: 5/2/07  
 Unit: 1745 Phone Number 301-772-1301 Serial Number: 091579, 576  
 Mail Box and Bldg/Room Location: \_\_\_\_\_ Results Format Preferred (circle): PAPER DISK E-MAIL

**More than one search is submitted, please prioritize searches in order of need.**

\*\*\*\*\*  
 Provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or novelty of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc., if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Field of Invention: Positive Active Material Composition

Inventors (please provide full names): \_\_\_\_\_

Earliest Priority Filing Date: 5/25/2000

*\* Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

PLEASE SEARCH THE  
COMPOUNDS of claims

5 + 29 - 35

Thanks,


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Searcher: [Signature]  
 Searcher Phone #: \_\_\_\_\_  
 Searcher Location: \_\_\_\_\_  
 Date Searcher Picked Up: 5/14/07  
 Date Completed: 5/14/07  
 Searcher Prep & Review Time: \_\_\_\_\_  
 Critical Prep Time: 30  
 Online Time: 45

**Type of Search**

NA Sequence (#) \_\_\_\_\_  
 AA Sequence (#) \_\_\_\_\_  
 Structure (#) ☒  
 Bibliographic \_\_\_\_\_  
 Litigation \_\_\_\_\_  
 Fulltext \_\_\_\_\_  
 Patent Family \_\_\_\_\_  
 Other \_\_\_\_\_

**Vendors and cost where applicable**

STN ☒  
 Dialog \_\_\_\_\_  
 Questel/Orbit \_\_\_\_\_  
 Dr. Link \_\_\_\_\_  
 Lexis/Nexis \_\_\_\_\_  
 Sequence Systems \_\_\_\_\_  
 WWW/Internet \_\_\_\_\_  
 Other (specify) \_\_\_\_\_

=> fil hcaplus

FILE 'HCAPLUS' ENTERED AT 14:16:15 ON 14 MAY 2007

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FILE COVERS 1907 - 14 May 2007 VOL ISS ISS

FILE LAST UPDATED: 13 May 2007 (20070513/ED)

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FILE LAST UPDATED: 1 May 2007 (20070501/ED)

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This file contains CAS Registry Numbers for easy and accurate

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L96 ANSWER 1 OF 3 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2002:491568 HCAPLUS

DN 137:49652

TI Method for preparation of **cathode** active material composition

IN **Kwon, Ho Jin; Kim, Gi Ho;** Lee, Yong Beom; Lee, Jin Su;  
Choi, Yun Seok; Han, Se Jong

PA **Samsung SDI Co., Ltd., S. Korea**

SO Repub. Korean Kongkae Taeho Kongbo, No pp. given

CODEN: KRXXA7

DT **Patent**

LA Korean

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	KR 2000067534	A	20001125	KR 1999-15430	19990429 <--
PRAI	KR 1999-15430		19990429	<--	

AB A **cathode** active material composition is provided to improve the stabilization of a **battery** by suppressing an elec. chemical reaction. The **cathode** active material composition has a semiconduction characteristics by adding a semiconductor-being agent to a lithium compound oxide such as LiNO<sub>2</sub>, LiCoO<sub>2</sub>, LiMn<sub>2</sub>O<sub>4</sub>, and LiNi<sub>1-x</sub>Co<sub>x</sub>O<sub>2</sub> so as to have such a pos. temperature coefficient resistivity characteristics that a resistance is suddenly increased according to temperature increment over a predetd. temperature The semiconductor-being agent comprises one selected from a group of Ba, Ti, Nb, Sb, Ta, Bi, La, Cs, Y, Pr, Nd, Sm, Gd, and Ho.

IC ICM **H01M0004-58**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery cathode** active material compn

IT **Battery cathodes**

Semiconductor materials

(method for preparation of **cathode** active material composition)

IT **12031-65-1**, Lithium nickel oxide **12057-17-9**,

Lithium manganese oxide **12190-79-3**, Cobalt lithium oxide

colio2 **131344-56-4**, Cobalt lithium nickel oxide

RL: DEV (Device component use); USES (Uses)

(method for preparation of **cathode** active material composition)

IT 7439-91-0, Lanthanum, uses 7440-00-8, Neodymium, uses 7440-03-1, Niobium, uses 7440-10-0, Praseodymium, uses 7440-19-9, Samarium, uses 7440-25-7, Tantalum, uses 7440-32-6, Titanium, uses 7440-36-0, Antimony, uses **7440-39-3**, Barium, uses 7440-46-2, Cesium, uses 7440-54-2, Gadolinium, uses 7440-60-0, Holmium, uses 7440-65-5, Yttrium, uses 7440-69-9, Bismuth, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(method for preparation of **cathode** active material composition)

IT **12031-65-1**, Lithium nickel oxide linio2 **12057-17-9**, Lithium manganese oxide limn2o4 **12190-79-3**, Cobalt lithium oxide colio2 **131344-56-4**, Cobalt lithium nickel oxide

RL: DEV (Device component use); USES (Uses)

(method for preparation of **cathode** active material composition)

RN 12031-65-1 HCAPLUS

CN Lithium nickel oxide (LiNiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 12057-17-9 HCAPLUS

CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS

CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

RN 131344-56-4 HCAPLUS

CN Cobalt lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

IT **7440-39-3**, Barium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(method for preparation of **cathode** active material composition)

RN 7440-39-3 HCAPLUS  
CN Barium (CA INDEX NAME)

Ba

L96 ANSWER 2 OF 3 HCAPLUS COPYRIGHT 2007 ACS on STN  
AN 2001:617939 HCAPLUS  
DN 135:183294  
TI A method for preparing lithium manganese spinel complex oxide for lithium  
**battery cathodes**  
IN Park, Hong-Kyu; **Kwon, Yong-Hoon**; Bae, Joon-Sung; Lee, Ki-Young  
PA LG Chemical Ltd., S. Korea  
SO PCT Int. Appl., 22 pp.  
CODEN: PIXXD2  
DT **Patent**  
LA English  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001060749	A1	20010823	WO 2001-KR99	20010119 <--
	W: AU, CN, IN, JP, SG, US				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
	KR 2001081546	A	20010829	KR 2000-7343	20000216 <--
	EP 1204602	A1	20020515	EP 2001-953017	20010119 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
	JP 2003522714	T	20030729	JP 2001-559806	20010119 <--
	JP 3770834	B2	20060426		
	US 2002182502	A1	20021205	US 2001-959129	20011015 <--
	US 7056486	B2	20060606		
PRAI	KR 2000-7343	A	20000216 <--		
	WO 2001-KR99	W	20010119		

AB The present invention relates to lithium manganese complex oxide with a spinel structure used as an active material of a lithium or lithium ion secondary **battery**. Specifically, the present invention relates to a process for preparing lithium manganese complex oxide having improved cyclic performance at a high temperature above room temperature, and a lithium

or lithium ion secondary **battery** using the oxide prepared according to the process as a **cathode** active material.

IC C01G0045-02; H01M0004-50

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 49

ST lithium manganese oxide prepn **cathode battery**

IT **Secondary batteries**

(lithium; method for preparing lithium manganese spinel complex oxide for lithium **battery cathodes**)

IT **Battery cathodes**

(method for preparing lithium manganese spinel complex oxide for lithium **battery cathodes**)

IT Fluoropolymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(method for preparing lithium manganese spinel complex oxide for lithium **battery cathodes**)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-03-1, Niobium, uses

7440-21-3, Silicon, uses 7440-31-5, Tin, uses 7440-32-6,  
 Titanium, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses  
 7440-55-3, Gallium, uses 7440-62-2, Vanadium, uses 7440-65-5,  
 Yttrium, uses 7440-67-7, Zirconium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (dopant; method for preparing lithium manganese spinel complex oxide for  
 lithium **battery cathodes**)

IT 96-49-1, Ethylene carbonate 623-53-0, Ethyl methyl carbonate  
 7439-93-2, Lithium, uses 21324-40-3, Lithium hexafluorophosphate  
 RL: DEV (Device component use); USES (Uses)  
 (method for preparing lithium manganese spinel complex oxide for lithium  
**battery cathodes**)

IT 155472-67-6P, Lithium manganese oxide Li1.05Mn1.95O4  
 355831-88-8P, Lithium manganese oxide (Li1.03Mn1.97O4.02)  
 355831-89-9P, Cobalt lithium manganese oxide (Co0.05Li2Mn1.95O4)  
 355831-90-2P, Lithium manganese nickel zirconium oxide  
 (Li2Mn1.85Ni0.12Zr0.05O4) 355831-91-3P, Chromium lithium  
 manganese oxide (Cr0.05Li1.05Mn1.9O4)  
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP  
 (Preparation); USES (Uses)  
 (method for preparing lithium manganese spinel complex oxide for lithium  
**battery cathodes**)

IT 7782-42-5, Graphite, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (method for preparing lithium manganese spinel complex oxide for lithium  
**battery cathodes**)

IT 546-89-4, Lithium acetate 556-63-8, Lithium formate 598-62-9,  
 Manganous carbonate 638-38-0, Manganous acetate 1310-65-2, Lithium  
 hydroxide 1310-66-3, Lithium hydroxide monohydrate 1313-13-9,  
 Manganese dioxide, reactions 1317-34-6, manganese oxide mn2o3  
 1317-35-7, manganese oxide mn3o4 3251-96-5, Manganous formate  
 6108-23-2, Lithium formate monohydrate 7785-87-7, Manganous sulfate  
 7790-69-4, Lithium nitrate 10377-66-9, Manganous nitrate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (method for preparing lithium manganese spinel complex oxide for lithium  
**battery cathodes**)

IT 24937-79-9, PvdF  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (method for preparing lithium manganese spinel complex oxide for lithium  
**battery cathodes**)

IT 7440-21-3, Silicon, uses 7440-55-3, Gallium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (dopant; method for preparing lithium manganese spinel complex oxide for  
 lithium **battery cathodes**)

RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

RN 7440-55-3 HCAPLUS  
 CN Gallium (CA INDEX NAME)

Ga

IT 155472-67-6P, Lithium manganese oxide Li1.05Mn1.95O4  
 355831-88-8P, Lithium manganese oxide (Li1.03Mn1.97O4.02)

**355831-89-9P**, Cobalt lithium manganese oxide (Co0.05Li2Mn1.95O4)

**355831-91-3P**, Chromium lithium manganese oxide

(Cr0.05Li1.05Mn1.9O4)

RL: DEV (Device component use); SPN (Synthetic preparation); PREP

(Preparation); USES (Uses)

(method for preparing lithium manganese spinel complex oxide for lithium  
**battery cathodes**)

RN 155472-67-6 HCAPLUS

CN Lithium manganese oxide (Li1.05Mn1.95O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	1.95	7439-96-5
Li	1.05	7439-93-2

RN 355831-88-8 HCAPLUS

CN Lithium manganese oxide (Li1.03Mn1.97O4.02) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4.02	17778-80-2
Mn	1.97	7439-96-5
Li	1.03	7439-93-2

RN 355831-89-9 HCAPLUS

CN Cobalt lithium manganese oxide (Co0.05Li2Mn1.95O4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.05	7440-48-4
Mn	1.95	7439-96-5
Li	2	7439-93-2

RN 355831-91-3 HCAPLUS

CN Chromium lithium manganese oxide (Cr0.05Li1.05Mn1.9O4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Cr	0.05	7440-47-3
Mn	1.9	7439-96-5
Li	1.05	7439-93-2

#### RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Cho, J	1999	2	607	Electrochem Solid-St	HCAPLUS
Japan Metals & Chem Co	1998			JP 10055797 A	HCAPLUS
Nissan Motor Co Ltd	2000			JP 2000030709 A	HCAPLUS
Westaim Technologies In	1997			WO 9749136 A1	HCAPLUS

L96 ANSWER 3 OF 3 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:890012 HCAPLUS  
 DN 134:59097  
 TI Compositions of **cathode** active mass for secondary lithium  
**batteries** and manufacture of the **battery**  
**cathodes**  
 IN **Kwon, Ho Jin; Chung, Hyun Sook; Kim, Geun Bae;**  
**Park, Dong Gon; Kim, Ki Ho**  
 PA **Samsung SDI Co., Ltd., S. Korea**  
 SO Jpn. Kokai Tokkyo Koho, 17 pp.  
 CODEN: JKXXAF  
 DT **Patent**  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000353526	A	20001219	JP 2000-155373	20000525 <--
	KR 2000074690	A	20001215	KR 1999-18802	19990525 <--
	KR 2000074691	A	20001215	KR 1999-18803	19990525 <--
	KR 2001018452	A	20010305	KR 1999-34414	19990819 <--
	KR 2001035700	A	20010507	KR 1999-42394	19991001 <--
	CN 1274956	A	20001129	CN 2000-106398	20000525 <--
	US 2006292446	A1	20061228	US 2006-510301	20060825 <--
PRAI	KR 1999-18802	A	19990525	<--	
	KR 1999-18803	A	19990525	<--	
	KR 1999-34414	A	19990819	<--	
	KR 1999-42394	A	19991001	<--	
	US 2000-579576	A3	20000525	<--	

AB The **cathode** active mass is a Li containing multiple metal compound mixed with an additive selected from metalloid, metal, and/or their oxides. The metalloid is selected from Si, b, Ti, Ga, Ge, and Al; the metal is Ca, Mg, Sr, and/or Ba; and the multiple metal compound is  $\text{Li}_x\text{Mn}_2\text{A}_2$  ( $1.0 \leq x \leq 1.1$ , A = O, S, F, and/or P),  $\text{Li}_x\text{Mn}_2\text{A}_4$ ,  $\text{Li}_x(\text{Ni}, \text{Co})\text{A}_2$ , where Mn, B, Co, and Ni may be partially substituted. The **cathodes** are prepared by mixing the multiple metal compound with the additive, adding an organic solvent to the mixture, applying the mixture on collectors, and drying.

IC ICM **H01M0004-58**

ICS **H01M0004-02; H01M0004-04; H01M0004-62**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery cathode** metal additive;  
 metalloid additive secondary lithium **battery cathode**;  
 oxide additive secondary lithium **battery cathode**

IT **Battery cathodes**

(multiple metal compound **cathode** active mass containing metal and metalloid additives for secondary lithium **batteries**)

IT **12057-17-9**, Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ ) **12190-79-3**, Cobalt lithium oxide ( $\text{CoLiO}_2$ ) **262857-75-0**, Cobalt lithium nickel strontium oxide ( $\text{Co}_{0.1}\text{LiNi}_{0.9}\text{Sr}_{0.002}\text{O}_2$ ) **313693-41-3**, Cobalt lanthanum lithium nickel oxide ( $\text{Co}_{0.12}\text{La}_{0.01}\text{LiNi}_{0.88}\text{O}_2$ )

RL: DEV (Device component use); USES (Uses)

(multiple metal compound **cathode** active mass containing metal and metalloid additives for secondary lithium **batteries**)

IT 1305-78-8, Calcia, uses **7440-21-3**, Silicon, uses **7631-86-9**, Silica, uses

RL: MOA (Modifier or additive use); USES (Uses)

(multiple metal compound **cathode** active mass containing metal and metalloid additives for secondary lithium **batteries**)

IT **12057-17-9**, Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ ) **12190-79-3**, Cobalt lithium oxide ( $\text{CoLiO}_2$ ) **262857-75-0**, Cobalt lithium nickel strontium oxide ( $\text{Co}_{0.1}\text{LiNi}_{0.9}\text{Sr}_{0.002}\text{O}_2$ ) **313693-41-3**,



Cobalt lanthanum lithium nickel oxide (Co<sub>0.12</sub>La<sub>0.01</sub>LiNi<sub>0.88</sub>O<sub>2</sub>)

RL: DEV (Device component use); USES (Uses)

(multiple metal compound **cathode** active mass containing metal and metalloid additives for secondary lithium **batteries**)

RN 12057-17-9 HCAPLUS

CN Lithium manganese oxide (LiMn<sub>2</sub>O<sub>4</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS

CN Cobalt lithium oxide (CoLiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

RN 262857-75-0 HCAPLUS

CN Cobalt lithium nickel strontium oxide (Co<sub>0.1</sub>LiNi<sub>0.9</sub>Sr<sub>0.02</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Sr	0.02	7440-24-6
Ni	0.9	7440-02-0
Li	1	7439-93-2

RN 313693-41-3 HCAPLUS

CN Cobalt lanthanum lithium nickel oxide (Co<sub>0.12</sub>La<sub>0.01</sub>LiNi<sub>0.88</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.12	7440-48-4
Ni	0.88	7440-02-0
Li	1	7439-93-2
La	0.01	7439-91-0

IT 7440-21-3, Silicon, uses

RL: MOA (Modifier or additive use); USES (Uses)

(multiple metal compound **cathode** active mass containing metal and metalloid additives for secondary lithium **batteries**)

RN 7440-21-3 HCAPLUS

CN Silicon (CA INDEX NAME)

Si

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L95 ANSWER 1 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2002:921831 HCAPLUS

DN 137:387146

TI Rechargeable spinel lithium **batteries** with greatly improved elevated temperature cycle life

IN Zhang, Meijie; Wang, Yu; Reimers, Jan Naess; Gee, Michael

PA E-One Moli Energy (Canada) Limited, Can.

SO U.S., 18 pp., Cont.-in-part of U.S. Ser. No. 318,854, abandoned.

CODEN: USXXAM

DT **Patent**

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6489060	B1	20021203	US 2000-484399	20000114 <--
	CA 2308404	A1	20001126	CA 2000-2308404	20000510 <--
	JP 2001006678	A	20010112	JP 2000-155499	20000525 <--
	JP 3498947	B2	20040223		
	EP 1056143	A2	20001129	EP 2000-111435	20000526 <--
	EP 1056143	A3	20040728		

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO

PRAI US 1999-318854 B2 19990526 <--

US 2000-484399 A 20000114 <--

AB The loss in delivered capacity (capacity fade) after cycling non-aqueous rechargeable lithium manganese oxide **batteries** at elevated temps. can be greatly reduced by depositing a small amount of certain foreign metal species on the surface of spinel in the **cathode**.

In particular the foreign metal species are from compds. having either bismuth, lead, lanthanum, barium, zirconium, yttrium, strontium, zinc or magnesium. The foreign metal species are introduced to the surface of spinel by moderately heating either an aqueous treated mixture or a dry mixture of

ready-made spinel and the foreign metal compound

IC ICM H01M0004-50

ICS H01M0004-58; H01M0006-00

INCL 429224000; 429231100; 029623100

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery** lithium spinel secondary improved temp cycle life

IT Oxidation

(alc.; rechargeable spinel lithium **batteries** with greatly improved elevated temperature cycle life)

IT **Secondary batteries**

(lithium; rechargeable spinel lithium **batteries** with greatly improved elevated temperature cycle life)

IT Carbonaceous materials (technological products)

RL: DEV (Device component use); USES (Uses)

(rechargeable spinel lithium **batteries** with greatly improved elevated temperature cycle life)

IT 301-04-2, Lead acetate 557-34-6, Zinc acetate 7439-95-4D, Magnesium, compound 7440-24-6D, Strontium, compound **7440-39-3D**, Barium, compound 7440-65-5D, Yttrium, compound 7721-01-9, Tantalum pentachloride 10026-12-7, Niobium pentachloride 10361-44-1, Bismuth nitrate 12027-67-7, Ammonium molybdate 13826-66-9, Zirconyl nitrate 14017-46-0, Lanthanumperchlorate

RL: CPS (Chemical process); **MOA (Modifier or additive use)**; PEP  
 (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (rechargeable spinel lithium **batteries** with greatly improved  
 elevated temperature cycle life)

IT 64-17-5, Ethanol, processes 67-56-1, Methanol, processes  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
 process); PROC (Process)  
 (rechargeable spinel lithium **batteries** with greatly improved  
 elevated temperature cycle life)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7,  
 Propylene carbonate 623-53-0, Ethyl methyl carbonate 7782-42-5,  
 Graphite, uses 21324-40-3, Lithium hexafluorophosphate  
**39457-42-6**, Lithium manganese oxide  
 RL: DEV (Device component use); USES (Uses)  
 (rechargeable spinel lithium **batteries** with greatly improved  
 elevated temperature cycle life)

IT 1304-28-5, Barium oxide, uses 1304-76-3, Bismuth oxide, uses  
 1309-48-4, Magnesium oxide, uses 1312-81-8, Lanthanum oxide 1314-11-0,  
 Strontium oxide, uses 1314-13-2, Zinc oxide, uses 1314-23-4, Zirconium  
 oxide, uses 1314-36-9, Yttrium oxide, uses 1335-25-7, Lead oxide  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (rechargeable spinel lithium **batteries** with greatly improved  
 elevated temperature cycle life)

IT **7440-39-3D**, Barium, compound  
 RL: CPS (Chemical process); **MOA (Modifier or additive use)**; PEP  
 (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (rechargeable spinel lithium **batteries** with greatly improved  
 elevated temperature cycle life)

RN 7440-39-3 HCAPLUS  
 CN Barium (CA INDEX NAME)

Ba

IT **39457-42-6**, Lithium manganese oxide  
 RL: DEV (Device component use); USES (Uses)  
 (rechargeable spinel lithium **batteries** with greatly improved  
 elevated temperature cycle life)

RN 39457-42-6 HCAPLUS  
 CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Amatucci	1998			US 5705291 A	HCAPLUS
Amatucci	1998			US 5759720 A	HCAPLUS
Anon	1993			JP 05047384	
Anon	1997			JP 09134723	HCAPLUS
Anon	1998			JP 10302767	HCAPLUS
Aurbach, D	1994	141	L1	J Electrochem Soc	HCAPLUS
Aurbach, D	1995	142	1746	J Electrochem Soc	HCAPLUS

Aurbach, D	1995	142	2873	J Electrochem Soc	HCAPLUS
Barker	2001			US 6183718 B1	HCAPLUS
Funatsu	1995			US 5478673 A	HCAPLUS
Howard	2001			US 6248477 B1	HCAPLUS
Klein	1980			US 4225657 A	
Larcher, D	1998	145	3392	J Electrochem Soc	HCAPLUS
Mao	1999			US 5891592 A	HCAPLUS
Mao	1999			US 5964902 A	HCAPLUS
Miyasaka	1999			US 5882821 A	HCAPLUS
Reimers	1999			US 5882218 A	HCAPLUS
Reimers	2000			US 6074777 A	HCAPLUS
Shimamura	2000			US 6090505 A	HCAPLUS
Tomantschger	1995			US 5424145 A	HCAPLUS
Toyoguchi	1992			US 5147738 A	HCAPLUS
Wang	1998			Proposed Mechanism f	
Yu, W	1998			Poster III, The 9th	

L95 ANSWER 2 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2002:824242 HCAPLUS

DN 138:109151

TI Preparation of Li-Fe group oxide compounds by combustion synthesis

IN Potemkin, G. A.; Postnikov, A. Yu.; Malyshev, A. Ya.; Levakov, E. V.

PA Rossiiskii Federal'nyi Yadernyi Tsentr - Vserossiiskii

Nauchno-Issledovatel'skii Institut Eksperimental'noi Fiziki, Russia

SO Russ., No pp. given

CODEN: RUXXE7

DT **Patent**

LA Russian

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	RU 2183587	C2	20020620	RU 2000-105770	20000309 <--
PRAI	RU 2000-105770		20000309 <--		

AB The starting mixture containing Li hydride, Fe-group metal oxide, and alkali metal perchlorate is processed by high-temperature combustion for the synthesis of LiFeO<sub>2</sub>-type compds. The starting mixture optionally includes minor alloying additives of Li, Na, Ca, Sr, Ba, Al, Cr, V, Ce, In, and/or Mn, or optionally their oxides. The resulting oxide product is purified by washing in water. The process is suitable for manufacture of **electrode materials for batteries or fuel cells**. The LiCoO<sub>2</sub> type compound containing minor Al was manufactured from the starting mixture

containing Li hydride 6.4, Co<sub>2</sub>O<sub>3</sub> 61.5, K perchlorate 31.2, and Al 0.9% by weight

IC ICM C01G0001-02

ICS C01D0015-02

CC 49-3 (Industrial Inorganic Chemicals)

Section cross-reference(s): 52

IT **Fuel cell electrodes**

(oxides for; preparation of Li-Fe group oxide compds. by combustion synthesis)

IT 7429-90-5, Aluminum, uses 7439-96-5, Manganese, uses 7440-23-5, Sodium, uses 7440-24-6, Strontium, uses **7440-39-3**, Barium, uses 7440-45-1, Cerium, uses 7440-47-3, Chromium, uses 7440-62-2, Vanadium, uses **7440-70-2**, Calcium, uses 7440-74-6, Indium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(oxides with; preparation of Li-Fe group oxide compds. by combustion synthesis)

IT 12022-46-7P, Iron lithium oxide (FeLiO<sub>2</sub>) **12031-65-1P**, Lithium

nickel oxide (LiNiO<sub>2</sub>) **12190-79-3P**, Cobalt lithium oxide (CoLiO<sub>2</sub>)  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of Li-Fe group oxide compds. by combustion synthesis)  
 IT **7440-39-3**, Barium, uses **7440-70-2**, Calcium, uses  
 RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (oxides with; preparation of Li-Fe group oxide compds. by combustion  
 synthesis)  
 RN 7440-39-3 HCAPLUS  
 CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

IT **12031-65-1P**, Lithium nickel oxide (LiNiO<sub>2</sub>) **12190-79-3P**,  
 Cobalt lithium oxide (CoLiO<sub>2</sub>)  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of Li-Fe group oxide compds. by combustion synthesis)  
 RN 12031-65-1 HCAPLUS  
 CN Lithium nickel oxide (LiNiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS  
 CN Cobalt lithium oxide (CoLiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

L95 ANSWER 3 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2002:47917 HCAPLUS  
 DN 136:105122  
 TI Secondary lithium **battery**  
 IN Nishimura, Akihiko; Naruto, Toshiya; Kobayashi, Koji  
 PA Mitsubishi Chemical Corp., Japan  
 SO Jpn. Kokai Tokkyo Koho, 10 pp.  
 CODEN: JKXXAF  
 DT **Patent**  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002015740	A	20020118	JP 2001-127304	20010425 <--

PRAI JP 2000-125542 A 20000426 <--

AB The **battery** uses a carbonaceous **anode** and a ~~Li~~  
~~transition metal oxide cathode~~, and contains 100-1500 ppm (of  
the oxide) alkali metal and/or alkaline earth metal other than Li. The alkali  
metal and alkaline earth metal are preferably in the **cathode** active  
mass, which may also contain SO42-.

IC ICM **H01M0004-58**  
ICS **H01M0004-02; H01M0010-40**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery cathode** compn; lithium  
transition metal oxide **battery cathode** additive;  
alkali metal secondary lithium **battery cathode**  
additive; alk earth metal lithium **battery cathode**  
additive; sulfate ion secondary lithium **battery cathode**  
additive

IT **Battery cathodes**  
(**cathode** active mass containing alkali metal and alkaline earth metal  
and sulfate ion for secondary lithium **batteries**)

IT Alkali metals, uses  
Alkaline earth metals  
RL: MOA (Modifier or additive use); USES (Uses)  
(**cathode** active mass containing alkali metal and alkaline earth metal  
and sulfate ion for secondary lithium **batteries**)

IT **12190-79-3**, Cobalt lithium oxide (CoLiO2)  
RL: DEV (Device component use); USES (Uses)  
(**cathode** active mass containing alkali metal and alkaline earth metal  
and sulfate ion for secondary lithium **batteries**)

IT 7439-95-4, Magnesium, uses **7440-70-2**, Calcium, uses  
14808-79-8, Sulfate, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(**cathode** active mass containing alkali metal and alkaline earth metal  
and sulfate ion for secondary lithium **batteries**)

IT **12190-79-3**, Cobalt lithium oxide (CoLiO2)  
RL: DEV (Device component use); USES (Uses)  
(**cathode** active mass containing alkali metal and alkaline earth metal  
and sulfate ion for secondary lithium **batteries**)

RN 12190-79-3 HCAPLUS

CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

IT **7440-70-2**, Calcium, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(**cathode** active mass containing alkali metal and alkaline earth metal  
and sulfate ion for secondary lithium **batteries**)

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

L95 ANSWER 4 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
AN 2002:47916 HCAPLUS

DN 136:105121  
 TI **Cathode** active mass for secondary lithium **battery**  
 IN Nishimura, Akihiko  
 PA Mitsubishi Chemical Corp., Japan  
 SO Jpn. Kokai Tokkyo Koho, 9 pp.  
 CODEN: JKXXAF  
 DT **Patent**  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002015739	A	20020118	JP 2001-127303	20010425 <--
PRAI	JP 2000-125544	A	20000426	<--	

AB The **cathode** active mass is Li transition metal oxide containing 100-1500 ppm Group 1 and/or Group 2 elements other than Li and 150-10,000 SO42-.

IC ICM **H01M0004-58**  
 ICS **H01M0004-02; H01M0010-40**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery cathode** active mass; iron transition metal oxide **battery cathode**; alkali metal secondary lithium **battery cathode** active mass; alk earth metal lithium **battery cathode** active mass; sulfate ion lithium **battery cathode** active mass

IT **Battery cathodes**  
 (**cathode** active mass containing alkali and alkaline earth metals and sulfate ions for secondary lithium **batteries**)

IT Alkali metals, uses  
 Alkaline earth metals  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (**cathode** active mass containing alkali and alkaline earth metals and sulfate ions for secondary lithium **batteries**)

IT **12190-79-3**, Cobalt lithium oxide (CoLiO2)  
 RL: DEV (Device component use); USES (Uses)  
 (**cathode** active mass containing alkali and alkaline earth metals and sulfate ions for secondary lithium **batteries**)

IT 7439-95-4, Magnesium, uses **7440-70-2**, Calcium, uses 14808-79-8, Sulfate, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (**cathode** active mass containing alkali and alkaline earth metals and sulfate ions for secondary lithium **batteries**)

IT **12190-79-3**, Cobalt lithium oxide (CoLiO2)  
 RL: DEV (Device component use); USES (Uses)  
 (**cathode** active mass containing alkali and alkaline earth metals and sulfate ions for secondary lithium **batteries**)

RN 12190-79-3 HCAPLUS

CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

IT **7440-70-2**, Calcium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (**cathode** active mass containing alkali and alkaline earth metals and sulfate ions for secondary lithium **batteries**)

RN **7440-70-2** HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

L95 ANSWER 5 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2001:796596 HCAPLUS

DN 135:333337

TI secondary lithium **batteries**

IN Nishimura, Akihiko; Naruto, Toshiya

PA Mitsubishi Chemical Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001307728	A	20011102	JP 2000-125543	20000426 <--
PRAI	JP 2000-125543		20000426 <--		

AB The **batteries** have a Co Li oxide **cathode**, an **anode**, and a non-flowable electrolyte; where the oxide has a bending point on its potential/capacity curve near 4.1-4.2 V when charged against a Li counter **electrode**. When charged against a Li counter **electrode** in a testing cell, using a 1M LiClO<sub>4</sub> solution in a 1:1 (volume) ethylene carbonate-Me<sub>2</sub>CO<sub>3</sub> mixture, at 30 mA.h/h/g oxide at 25° to 4.3 V, the oxide shows a phase transition duration parameter  $A = [0.03/(C-C')] \leq 0.012$  V.g/mA.h, where C and C' are the cell capacities when charged to 4.165 and 4.135 V, resp.

IC ICM H01M0004-58

ICS H01M0004-02; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery cathode** charge curve characteristics; lithium cobalt oxide **battery cathode** charge curve characteristics

IT **Battery cathodes**

(cobalt lithium oxide with controlled phase transition characteristics during charge for secondary lithium **battery cathodes**)

IT 7429-90-5, Aluminum, uses 7439-95-4, Magnesium, uses 7440-70-2, Calcium, uses 14808-79-8, Sulfate, uses

RL: MOA (Modifier or additive use); USES (Uses)

(auxiliary components in cobalt lithium oxide **cathode** active mass for secondary lithium **batteries**)

IT 52627-24-4, Cobalt lithium oxide

RL: DEV (Device component use); PRP (Properties); USES (Uses)

(cobalt lithium oxide with controlled phase transition characteristics during charge for secondary lithium **battery cathodes**)

IT 7440-70-2, Calcium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(auxiliary components in cobalt lithium oxide **cathode** active mass for secondary lithium **batteries**)

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)



Ca

IT **52627-24-4**, Cobalt lithium oxide  
 RL: DEV (Device component use); PRP (Properties); USES (Uses)  
 (cobalt lithium oxide with controlled phase transition characteristics  
 during charge for secondary lithium **battery cathodes**  
 )  
 RN 52627-24-4 HCAPLUS  
 CN Cobalt lithium oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Li	x	7439-93-2

L95 ANSWER 6 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2001:781302 HCAPLUS  
 DN 135:320540  
 TI Electrochemical element with ceramic particles in the electrolyte layer  
 IN Den Boer, Johannis Josephus; Kelder, Erik Marie; Stewart, John Foreman  
 PA Shell Internationale Research Maatschappij BV, Neth.; Shell Canada Limited  
 SO PCT Int. Appl., 27 pp.  
 CODEN: PIXXD2  
 DT **Patent**  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001080344	A1	20011025	WO 2001-EP4295	20010412 <--
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	CA 2405746	A1	20011025	CA 2001-2405746	20010412 <--
	EP 1273067	A1	20030108	EP 2001-933830	20010412 <--
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	BR 2001009988	A	20030527	BR 2001-9988	20010412 <--
	JP 2003531466	T	20031021	JP 2001-577635	20010412 <--
	NZ 521763	A	20040528	NZ 2001-521763	20010412 <--
	IN 2002CN01659	A	20050128	IN 2002-CN1659	20021010 <--
	NO 2002004909	A	20021011	NO 2002-4909	20021011 <--
	US 2004038131	A1	20040226	US 2003-257553	20030206 <--
PRAI	EP 2000-303112	A	20000413	<--	
	EP 2000-303113	A	20000413	<--	
	WO 2001-EP4295	W	20010412		

AB A solid-state rechargeable **battery** or other electrochem. element for use at high (>40°) temperature comprises a **cathodic** and/or **anodic electrode** comprising, as a host material for alkali metal ions, a normal or inverse spinel type material and an

electrolyte layer sandwiched between the **electrodes**. The layer comprises ceramic electrolyte particles that are essentially free of electronically conductive components, and comprise less than 1% by weight of dissolved alkali containing salt thereby maintaining good performance as regards the capacities delivered during various charge/discharge cycles at a high temperature

IC ICM **H01M0010-36**  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 57  
 ST **battery** ceramic electrolyte particle  
 IT **Battery electrolytes**  
 (electrochem. element with ceramic particles in electrolyte layer)  
 IT **Secondary batteries**  
 (lithium; electrochem. element with ceramic particles in electrolyte layer)  
 IT 7439-93-2, Lithium, uses 7601-90-3D, Perchloric acid, alkali metal salts, uses 7664-38-2D, Phosphoric acid, alkali metal salts, uses 7664-93-9D, Sulfuric acid, alkali metal salts, uses 7791-03-9, Lithium perchlorate **12057-17-9**, Lithium manganese oxide  $\text{LiMn}_2\text{O}_4$  14283-07-9, Lithium tetrafluoroborate 16872-11-0D, alkali metal salts 21324-40-3, Lithium hexafluorophosphate 33454-82-9, Lithium triflate 120479-61-0, Aluminum lithium titanium phosphate  $\text{Al}_0.3\text{Li}_1.3\text{Ti}_1.7(\text{PO}_4)_3$  123921-35-7, Lithium titanium oxide  $\text{Li}_1.33\text{Ti}_1.67\text{O}_4$   
 RL: DEV (Device component use); USES (Uses)  
 (electrochem. element with ceramic particles in electrolyte layer)  
 IT 1306-23-6, Cadmium sulfide, uses **7440-21-3**, Silicon, uses 7782-42-5, Graphite, uses 13463-67-7, Titania, uses  
 RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (electrochem. element with ceramic particles in electrolyte layer)  
 IT **12057-17-9**, Lithium manganese oxide  $\text{LiMn}_2\text{O}_4$   
 RL: DEV (Device component use); USES (Uses)  
 (electrochem. element with ceramic particles in electrolyte layer)  
 RN 12057-17-9 HCAPLUS  
 CN Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ ) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

IT **7440-21-3**, Silicon, uses  
 RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (electrochem. element with ceramic particles in electrolyte layer)  
 RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

#### RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
=====	=====	=====	=====	=====	=====
Kelder, E	1996	85	285	SOLID STATE IONICS	
Mhb Joint Venture	1990			EP 0379372 A	HCAPLUS
Moli Energy 1990 Ltd	1995			EP 0656667 A	HCAPLUS
Tomiyama, H	1997			US 5677083 A	HCAPLUS

Wang, W |1997 | | |CN 1156911 A |HCAPLUS .

L95 ANSWER 7 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2001:778281 HCAPLUS  
 DN 135:306303  
 TI Secondary lithium **batteries**  
 IN Shinkai, Ryuichiro; Ueshima, Hiroshi; Saito, Hirohiko  
 PA Denso Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 7 pp.  
 CODEN: JKXXAF  
 DT **Patent**  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001297765	A	20011026	JP 2000-111839	20000413 <--
PRAI	JP 2000-111839		20000413	<--	
AB	The <b>batteries</b> use <b>cathodes</b> containing active mass $\text{Li}_x\text{Ni}_{1-y}\text{MyO}_2$ ( $\text{M} = \text{B, Mg, Ca, Sr, Ba, Ti, V, Cr, Mn, Fe, Co, Cu, Al, In, Nb, Mo, W, Y, and/or Rh}$ ; $0.05 \leq x \leq 1.1$ , $y \leq 0.5$ ) having $(\text{I}006 + \text{I}102) / \text{I}101 \leq 0.427$ [ $\text{I}006$ , $\text{I}102$ , and $\text{I}101$ are the peak intensities of faces (006), (102), and (101), resp., on the x ray diffraction pattern of the active mass] and electrolyte solution containing an organic electrolyte. The electrolyte is preferably a Li salt of a bisperfluoroalkylsulfonylimide $\text{C}_m\text{F}_{2m+1}\text{SO}_2(\text{C}_n\text{F}_{2n+1}\text{SO}_2)\text{N.Li}$ ( $m$ and $n =$ integers 1-4).				
IC	ICM <b>H01M0004-58</b> ICS <b>H01M0004-02; H01M0010-40</b>				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	secondary lithium <b>battery cathode</b> electrolyte compn; substituted lithium nickel oxide <b>cathode</b> lithium <b>battery</b> ; x ray diffraction pattern lithium nickel oxide <b>cathode</b> ; perfluoroalkylsulfonyl imide lithium salt <b>battery</b> electrolyte				
IT	<b>Battery electrolytes</b> (electrolyte solns. containing perfluoroalkylsulfonyl amide lithium salts for secondary lithium <b>batteries</b> )				
IT	<b>Secondary batteries</b> (lithium; secondary lithium <b>batteries</b> containing substituted lithium nickel oxide <b>cathode</b> active mass and organic lithium salt electrolytes)				
IT	<b>Battery cathodes</b> (substituted lithium nickel oxides with controlled x ray diffraction patterns for <b>cathodes</b> in secondary lithium <b>batteries</b> )				
IT	7440-42-8, Boron, uses RL: MOA (Modifier or additive use); USES (Uses) (boron substituted lithium nickel oxides for <b>cathodes</b> in secondary lithium <b>batteries</b> )				
IT	176719-70-3 RL: DEV (Device component use); USES (Uses) (electrolyte solns. containing perfluoroalkylsulfonyl amide lithium salts for secondary lithium <b>batteries</b> )				
IT	7439-89-6, Iron, uses 7439-95-4, Magnesium, uses 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses 7440-03-1, Niobium, uses 7440-16-6, Rhodium, uses 7440-24-6, Strontium, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses <b>7440-39-3</b> , Barium, uses 7440-47-3, Chromium, uses 7440-50-8, Copper, uses 7440-62-2, Vanadium, uses 7440-65-5, Yttrium, uses <b>7440-70-2</b> , Calcium, uses 7440-74-6, Indium, uses RL: MOA (Modifier or additive use); USES (Uses)				

(metal substituted lithium nickel oxides for **cathodes** in secondary lithium **batteries**)

IT **245435-37-4**, Aluminum cobalt lithium nickel oxide  
(Al<sub>0.03</sub>Co<sub>0.16</sub>LiNi<sub>0.81</sub>O<sub>2</sub>)  
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
(substituted lithium nickel oxides with controlled x ray diffraction patterns for **cathodes** in secondary lithium **batteries**)

IT **7440-39-3**, Barium, uses **7440-70-2**, Calcium, uses  
RL: **MOA (Modifier or additive use)**; USES (Uses)  
(metal substituted lithium nickel oxides for **cathodes** in secondary lithium **batteries**)

RN **7440-39-3** HCAPLUS  
CN Barium (CA INDEX NAME)

Ba

RN **7440-70-2** HCAPLUS  
CN Calcium (CA INDEX NAME)

Ca

IT **245435-37-4**, Aluminum cobalt lithium nickel oxide  
(Al<sub>0.03</sub>Co<sub>0.16</sub>LiNi<sub>0.81</sub>O<sub>2</sub>)  
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
(substituted lithium nickel oxides with controlled x ray diffraction patterns for **cathodes** in secondary lithium **batteries**)

RN **245435-37-4** HCAPLUS  
CN Aluminum cobalt lithium nickel oxide (Al<sub>0.03</sub>Co<sub>0.16</sub>LiNi<sub>0.81</sub>O<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.16	7440-48-4
Ni	0.81	7440-02-0
Li	1	7439-93-2
Al	0.03	7429-90-5

L95 ANSWER 8 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
AN 2001:709866 HCAPLUS  
DN 135:245020  
TI Method for manufacturing **electrode** plates for **battery**  
IN Fujimatsu, Hitoshi; Yoshizawa, Hiroshi; Koshina, Hiruzu; Komori, Masakage  
PA Matsushita Electric Industrial Co., Ltd., Japan  
SO Eur. Pat. Appl., 12 pp.  
CODEN: EPXXDW  
DT **Patent**  
LA English  
FAN.CNT 1  
PATENT NO. KIND DATE APPLICATION NO. DATE

PI EP 1137081 A1 20010926 EP 2001-302556 20010320 <--  
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
 IE, SI, LT, LV, FI, RO  
 JP 2001266856 A 20010928 JP 2000-84816 20000324 <--  
 US 2001024750 A1 20010927 US 2001-813178 20010320 <--  
 US 6635385 B2 20031021  
 CN 1319904 A 20011031 CN 2001-111687 20010322 <--  
 PRAI JP 2000-84816 A 20000324 <--  
 AB A mixture of a polyolefin-based resin and a solvent is heated to a temperature  
 at  
 which at least part of the polyolefin-based resin melts to produce a  
 viscous, gel-like adhesive solution A mixture of the adhesive solution, an  
 active  
 material, and a conductive material is kneaded to produce a paste-form  
 mixture, and a collector is coated with this paste-form mixture to form a  
 mixture layer. The collector with the mixture layer formed thereon is then  
 heated and dried, after which it is press-molded to a specific thickness  
 and cut to a specific size to produce **electrode** plates.  
 IC ICM **H01M0004-04**  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38  
 ST **anode cathode manuf battery**  
 IT **Battery anodes**  
     **Battery cathodes**  
     (method for manufacturing **electrode** plates for **battery**)  
 IT Carbon black, uses  
 Carbon fibers, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
     (method for manufacturing **electrode** plates for **battery**)  
 IT Polyolefins  
 RL: TEM (Technical or engineered material use); USES (Uses)  
     (method for manufacturing **electrode** plates for **battery**)  
 IT 7782-42-5, Graphite, uses 12057-17-9, lithium manganese oxide  
 limn2o4 12190-79-3, cobalt lithium oxide colio2 174421-81-9,  
 Cobalt lithium nitride Co0.5Li2.5N  
 RL: DEV (Device component use); USES (Uses)  
     (method for manufacturing **electrode** plates for **battery**)  
 IT 7440-21-3, Silicon, uses 12201-89-7, nickel silicide nisi2  
 RL: MOA (Modifier or additive use); USES (Uses)  
     (method for manufacturing **electrode** plates for **battery**)  
 IT 91-17-8, Decalin 119-64-2, Tetralin 9002-88-4, Hdpe 9003-07-0,  
 Polypropylene 9003-29-6, Polybutene 9016-80-2, Polymethylpentene  
 25321-22-6, Dichlorobenzene  
 RL: TEM (Technical or engineered material use); USES (Uses)  
     (method for manufacturing **electrode** plates for **battery**)  
 IT 12057-17-9, lithium manganese oxide limn2o4 12190-79-3,  
 cobalt lithium oxide colio2  
 RL: DEV (Device component use); USES (Uses)  
     (method for manufacturing **electrode** plates for **battery**)  
 RN 12057-17-9 HCAPLUS  
 CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component
		Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS  
 CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

IT 7440-21-3, Silicon, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (method for manufacturing **electrode** plates for **battery**)  
 RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Dae Woo Electronics Co	1997			EP 0756345 A	HCAPLUS
Matsushita Electric Ind	2000			EP 0982787 A	HCAPLUS
Tdk Corp	2001			EP 1067612 A	HCAPLUS

L95 ANSWER 9 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2001:691895 HCAPLUS

DN 135:244996

TI Method of manufacturing a **battery**

IN Yoshino, Takanobu; Sugiyama, Tsuyoshi

PA Sony Corporation, Japan

SO Eur. Pat. Appl., 20 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 1134832	A2	20010919	EP 2001-106599	20010315 <--
EP 1134832	A3	20060816		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2001266841	A	20010928	JP 2000-76614	20000317 <--
NO 2001001288	A	20010918	NO 2001-1288	20010314 <--
CN 1316786	A	20011010	CN 2001-119019	20010316 <--
US 2002045094	A1	20020418	US 2001-811898	20010319 <--
US 6884270	B2	20050426		
US 2005155215	A1	20050721	US 2005-81341	20050316 <--
PRAI JP 2000-76614	A	20000317	<--	
US 2001-811898	A1	20010319		

AB A method is provided for manufacturing a **battery** capable of enhancing productivity and preventing deterioration of the **battery** performance. After attaching a pos. **electrode** terminal to a belt-shaped **electrode**, electrolyte layers are formed. This can decrease the number of manufacturing processes after forming electrolyte layers,  
 which effectively prevents that solvents in the electrolyte evaps. or the

electrolyte layers absorb the water. Thereby, manufacturing yields of the **battery** can be enhanced, addnl., a **battery** excellent in discharge capabilities and stable in voltage can be attained.

- IC ICM H01M0010-40
- ICS H01M0010-12; H01M0002-36
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 37
- ST **battery cathode** electrolyte layer manufg
- IT **Battery cathodes**  
    **Battery electrolytes**  
    **Secondary batteries**  
        (method of manufacturing **battery**)
- IT Carbon black, uses  
Carbonaceous materials (technological products)  
Oxides (inorganic), uses  
RL: MOA (Modifier or additive use); USES (Uses)  
    (method of manufacturing **battery**)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
    (method of manufacturing **battery**)
- IT Macromolecular compounds  
RL: TEM (Technical or engineered material use); USES (Uses)  
    (method of manufacturing **battery**)
- IT Nitrile rubber, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
    (method of manufacturing **battery**)
- IT Polyoxyalkylenes, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
    (method of manufacturing **battery**)
- IT Polysiloxanes, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
    (polyether-denatured; method of manufacturing **battery**)
- IT 7782-42-5, Graphite, uses 7791-03-9, Lithium perchlorate 9011-17-0,  
Hexafluoropropylene-vinylidene fluoride copolymer 12190-79-3,  
cobalt lithium oxide colio2 14283-07-9, Lithium tetrafluoroborate  
21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium  
hexafluoroarsenate 33454-82-9, Lithium triflate 90076-65-6  
131651-65-5  
RL: DEV (Device component use); USES (Uses)  
    (method of manufacturing **battery**)
- IT 7440-21-3, Silicon, uses 7440-21-3D, Silicon, compds.,  
uses  
RL: MOA (Modifier or additive use); USES (Uses)  
    (method of manufacturing **battery**)
- IT 7439-93-2, Lithium, processes 7440-23-5, Sodium, processes 7440-70-2,  
Calcium, processes  
RL: PEP (Physical, engineering or chemical process); PROC (Process)  
    (method of manufacturing **battery**)
- IT 79-20-9, Methyl acetate 96-47-9, 2-Methyltetrahydrofuran 96-48-0  
96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-29-2,  
γ-Valerolactone 108-32-7, Propylene carbonate 109-99-9, Thf,  
uses 437-82-1, 2,6-Difluoroanisole 452-10-8, 2,4-Difluoroanisole  
554-12-1, Methyl propionate 616-38-6, Dimethyl carbonate 623-53-0,  
Ethylmethyl carbonate 646-06-0, 1,3-Dioxolane 2859-78-1 4437-85-8,  
Butylene carbonate 9002-88-4D, Polyethylene, chlorinated, polymer with  
propylene diene styrene and acrylonitrile 9003-00-3, Acrylonitrile-vinyl  
chloride copolymer 9003-56-9, Acrylonitrile-butadiene-styrene copolymer  
24937-79-9, PvdF 25014-41-9, Polyacrylonitrile 25214-69-1  
25322-68-3, Peo 25749-57-9 73506-93-1, Diethoxyethane  
RL: TEM (Technical or engineered material use); USES (Uses)

(method of manufacturing **battery**)  
 IT 9003-18-3  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (nitrile rubber, method of manufacturing **battery**)  
 IT 12190-79-3, cobalt lithium oxide colio2  
 RL: DEV (Device component use); USES (Uses)  
 (method of manufacturing **battery**)  
 RN 12190-79-3 HCAPLUS  
 CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

IT 7440-21-3, Silicon, uses 7440-21-3D, Silicon, compds.,  
 uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (method of manufacturing **battery**)  
 RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

L95 ANSWER 10 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2001:676701 HCAPLUS  
 DN 135:229379  
 TI Manufacture of lithium manganese oxides and lithium **batteries**  
 using the oxide  
 IN Suita, Tokuo; Kataoka, Kenji  
 PA Ishihara Sangyo Kaisha, Ltd., Japan  
 SO PCT Int. Appl., 32 pp.  
 CODEN: PIXXD2  
 DT **Patent**  
 LA Japanese  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001066468	A1	20010913	WO 2001-JP1814	20010308 <--
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			



JP 2002338246 A 20021127 JP 2001-62562 20010306 <--  
PRAI JP 2000-65298 A 20000309 <--  
JP 2001-62026 A 20010306

AB The oxides, containing other metal elements, are prepared by heating oxide precursors containing Fe, Cr, Co, Ni, Al, Mg, Ca, Zn, V, Nb, Mo, Ti, Zr, Ga, and/or In. The precursors are obtained by reacting a Li compound with (acid treated) Mn oxide or Mn acid, and providing the other metal elements to the reaction product. Secondary Li **batteries** use the oxides for **cathodes**.

IC ICM C01G0045-00  
ICS H01M0004-58; H01M0004-02; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery cathode** lithium manganese oxide manuf

IT **Battery cathodes**  
(manufacture of metal substituted lithium manganese oxides from substituent containing precursors for secondary lithium **battery cathodes**)

IT 7664-93-9, Sulfuric acid, miscellaneous  
RL: MSC (Miscellaneous)  
(acid treated manganese oxide in manufacture of metal substituted lithium manganese oxide for **cathodes** in secondary lithium **batteries**)

IT 39457-42-6, Lithium manganese oxide  
RL: PEP (Physical, engineering or chemical process); PROC (Process)  
(acid treated manganese oxide in manufacture of metal substituted lithium manganese oxide for **cathodes** in secondary lithium **batteries**)

IT 11129-60-5D, Manganese oxide, acid treated 12626-88-9, Manganese hydroxide  
RL: PEP (Physical, engineering or chemical process); PROC (Process)  
(intermediates in manufacture of metal substituted lithium manganese oxide for **cathodes** in secondary lithium **batteries**)

IT 53027-29-5P, Iron lithium manganese oxide 175786-46-6P,  
Lithium magnesium manganese oxide 204450-96-4P, Chromium lithium manganese oxide 214536-41-1P, Cobalt lithium manganese oxide  
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(manufacture of metal substituted lithium manganese oxides from substituent containing precursors for secondary lithium **battery cathodes**)

IT 7429-90-5, Aluminum, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-03-1, Niobium, uses 7440-32-6, Titanium, uses 7440-55-3, Gallium, uses 7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses 7440-67-7, Zirconium, uses 7440-70-2, Calcium, uses 7440-74-6, Indium, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(manufacture of metal substituted lithium manganese oxides from substituent containing precursors for secondary lithium **battery cathodes**)

IT 39457-42-6, Lithium manganese oxide  
RL: PEP (Physical, engineering or chemical process); PROC (Process)  
(acid treated manganese oxide in manufacture of metal substituted lithium manganese oxide for **cathodes** in secondary lithium **batteries**)

RN 39457-42-6 HCAPLUS

CN Lithium manganese oxide (CA INDEX NAME)

Component		Ratio		Component
				Registry Number

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

IT **53027-29-5P**, Iron lithium manganese oxide **175786-46-6P**,  
 Lithium magnesium manganese oxide **204450-96-4P**, Chromium lithium  
 manganese oxide **214536-41-1P**, Cobalt lithium manganese oxide  
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP  
 (Preparation); USES (Uses)  
 (manufacture of metal substituted lithium manganese oxides from substituent  
 containing precursors for secondary lithium **battery**  
**cathodes**)

RN 53027-29-5 HCAPLUS

CN Iron lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2
Fe	x	7439-89-6

RN 175786-46-6 HCAPLUS

CN Lithium magnesium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Mg	x	7439-95-4
Li	x	7439-93-2

RN 204450-96-4 HCAPLUS

CN Chromium lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Cr	x	7440-47-3
Mn	x	7439-96-5
Li	x	7439-93-2

RN 214536-41-1 HCAPLUS

CN Cobalt lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Mn	x	7439-96-5
Li	x	7439-93-2

IT **7440-55-3**, Gallium, uses **7440-70-2**, Calcium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(manufacture of metal substituted lithium manganese oxides from substituent

containing precursors for secondary lithium **battery cathodes**)

RN 7440-55-3 HCAPLUS  
CN Gallium (CA INDEX NAME)

Ga

RN 7440-70-2 HCAPLUS  
CN Calcium (CA INDEX NAME)

Ca

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Fine Ceramics Gijutsu K	1999			JP 11067204 A	HCAPLUS
Toyota Central Research	1998			JP 10199532 A	HCAPLUS
Ube Industries Ltd	2000			JP 2000072443 A	HCAPLUS

L95 ANSWER 11 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
AN 2001:618429 HCAPLUS  
DN 135:183304

TI Method of preparation of **cathode** active material for rechargeable lithium **battery**

IN Cho, Jae-Phil; Kim, Chan-Soo; Yoo, Sang-Im  
PA S. Korea

SO U.S. Pat. Appl. Publ., 11 pp.  
CODEN: USXXCO

DT **Patent**  
LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2001016285	A1	20010823	US 2001-780738	20010209 <--
	US 6555269	B2	20030429		
	KR 2001081181	A	20010829	KR 2000-6294	20000210 <--
	JP 2001243948	A	20010907	JP 2001-32803	20010208 <--
PRAI	KR 2000-6294	A	20000210	<--	

AB The title **cathode** active material includes a LiCoO<sub>2</sub> core and a metal selected from a group consisting of Al, Mg, Sn, Ca, Ti, Mn and mixts. thereof. The metal has a concentration gradient from a surface of the core to a center of the core. The method of preparing a pos. active material for a rechargeable lithium **battery** includes the steps of dissolving a metal compound in alc. to prepare a metal compound solution in a

sol state, coating LiCoO<sub>2</sub> with the metal compound solution in the sol state and sintering the coated LiCoO<sub>2</sub> at 150 to 500°.

IC ICM H01M0004-52  
ICS B05D0007-00

INCL 429231300

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **battery cathode** prepn; cobalt lithium oxide **cathode** prepn lithium **battery**

IT **Secondary batteries**

(lithium; method of preparation of **cathode** active material for

rechargeable lithium battery)

IT **Battery cathodes**  
Heat treatment  
(method of preparation of **cathode** active material for rechargeable lithium battery)

IT **12190-79-3**, cobalt lithium oxide colio2  
RL: DEV (Device component use); USES (Uses)  
(method of preparation of **cathode** active material for rechargeable lithium battery)

IT 7429-90-5, Aluminum, uses 7439-95-4, Magnesium, uses 7439-96-5, Manganese, uses 7440-31-5, Tin, uses 7440-32-6, Titanium, uses **7440-70-2**, Calcium, uses  
RL: **MOA (Modifier or additive use)**; USES (Uses)  
(method of preparation of **cathode** active material for rechargeable lithium battery)

IT 1308-06-1, cobalt oxide co3o4 1310-66-3, Lithium hydroxide monohydrate 288374-32-3  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(method of preparation of **cathode** active material for rechargeable lithium battery)

IT **12190-79-3**, cobalt lithium oxide colio2  
RL: DEV (Device component use); USES (Uses)  
(method of preparation of **cathode** active material for rechargeable lithium battery)

RN 12190-79-3 HCAPLUS .

CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

IT **7440-70-2**, Calcium, uses  
RL: **MOA (Modifier or additive use)**; USES (Uses)  
(method of preparation of **cathode** active material for rechargeable lithium battery)

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

L95 ANSWER 12 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2001:434984 HCAPLUS

DN 135:48567

TI Method for preparation of lithium cobalt oxides for use as **cathodes** of lithium-ion secondary **batteries**

IN Yakovleva, Marina; Gao, Yuan; Burba, John L., III; Engel, John F.

PA FMC Corporation, USA

SO PCT Int. Appl., 63 pp.

CODEN: PIXXD2

DT **Patent**

LA English

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----

PI WO 2001042141 A1 20010614 WO 2000-US33137 20001207 <--  
W: AE, AG, AL, AM, AT, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,  
CN, CR, CU, CZ, CZ, DE, DE, DK, DK, DM, DZ, EE, EE, ES, FI, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,  
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,  
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK, SL, TJ, TM, TR,  
TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD,  
RU, TJ, TM  
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,  
DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF,  
BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG  
US 2002127175 A1 20020912 US 2000-731949 20001207 <--  
US 6579475 B2 20030617  
EP 1242311 A1 20020925 EP 2000-982491 20001207 <--  
EP 1242311 B1 20030502  
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
IE, SI, LT, LV, FI, RO, MK, CY, AL, TR  
JP 2003516297 T 20030513 JP 2001-543448 20001207 <--  
TW 539647 B 20030701 TW 2000-89126161 20001208 <--  
US 2003205700 A1 20031106 US 2003-424056 20030425 <--  
US 6932922 B2 20050823  
PRAI US 1999-170221P P 19991210 <--  
US 2000-731949 A3 20001207  
WO 2000-US33137 W 20001207

AB The present invention includes lithium cobalt oxides having hexagonal layered crystal structures and methods of making same. The lithium cobalt oxides of the invention have the formula  $\text{Li}_w\text{Co}_1-\text{x}\text{A}_x\text{O}_2+\text{y}$  wherein  $0.96 \leq w \leq 1.05$ ,  $0 \leq x \leq 0.05$ ,  $-0.02 \leq y \leq 0.02$  and A is one or more dopant. The lithium cobalt oxides of the invention preferably have a position within the principal component space defined by the relationship  $\text{axi}+\text{byi} \leq c$ , wherein  $\text{xi} = \text{i.Pcl}$ ;  $\text{yi} = \text{Si.Pc2}$ ; the vector Si is the x-ray spectrum for the  $\text{Li}_w\text{Co}_1-\text{x}\text{A}_x\text{O}_2+\text{y}$  compound; the vectors Pcl and Pc2 defining the principal component space are determined by measuring the x-ray powder diffraction values Si between  $15^\circ$  and  $120^\circ$  using a  $0.02^\circ$  step size and  $\text{CuK}\alpha$  rays for a large sample set of lithium cobalt oxides and using the regression of Si of the sample set against the capacity fade after 50 cycles of a lithium coin cell that includes a lithium neg. **electrode** and the lithium cobalt oxide as the pos. **electrode** material and that is cycled between 3.0 and 4.3 V at a constant current of C/3 during both charge and discharge cycles; and the values a, b and c are determined by using only the xi and yi values for  $\text{Li}_w\text{Co}_1-\text{x}\text{A}_x\text{O}_2+\text{y}$  compds. in the sample set that have a capacity fade after 50 cycles of less than or equal to 15%.

IC ICM C01G0051-00

ICS H01M0004-52

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 49

ST cobalt lithium oxide **cathode battery**

IT **Secondary batteries**

(button-type; method for preparation of lithium cobalt oxides for use as **cathodes** of lithium-ion secondary **batteries**)

IT **Secondary batteries**

(lithium; method for preparation of lithium cobalt oxides for use as **cathodes** of lithium-ion secondary **batteries**)

IT **Battery cathodes**

(method for preparation of lithium cobalt oxides for use as **cathodes** of lithium-ion secondary **batteries**)

IT Carbon black, uses

Fluoropolymers, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(method for preparation of lithium cobalt oxides for use as **cathodes**  
of lithium-ion secondary **batteries**)

IT 7429-90-5, Aluminum, uses 7439-95-4, Magnesium, uses 7439-96-5,  
Manganese, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses  
7440-21-3, Silicon, uses 7440-24-6, Strontium, uses 7440-31-5,  
Tin, uses 7440-32-6, Titanium, uses 7440-39-3, Barium, uses  
7440-55-3, Gallium, uses 7440-56-4, Germanium, uses  
7440-62-2, Vanadium, uses 7440-67-7, Zirconium, uses 7440-70-2  
, Calcium, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(dopant; method for preparation of lithium cobalt oxides for use as  
**cathodes** of lithium-ion secondary **batteries**)

IT 96-49-1, Ethylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2,  
Lithium, uses 21324-40-3, Lithium hexafluorophosphate 39300-70-4  
, Lithium nickel oxide 39457-42-6, Lithium manganese oxide

RL: DEV (Device component use); USES (Uses)  
(method for preparation of lithium cobalt oxides for use as **cathodes**  
of lithium-ion secondary **batteries**)

IT 52627-24-4P, Cobalt lithium oxide

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic  
preparation); PREP (Preparation); USES (Uses)  
(method for preparation of lithium cobalt oxides for use as **cathodes**  
of lithium-ion secondary **batteries**)

IT 24937-79-9, Polyvinylidene fluoride

RL: MOA (Modifier or additive use); USES (Uses)  
(method for preparation of lithium cobalt oxides for use as **cathodes**  
of lithium-ion secondary **batteries**)

IT 554-13-2, Lithium carbonate 1308-06-1, cobalt oxide  $\text{Co}_3\text{O}_4$

RL: RCT (Reactant); RACT (Reactant or reagent)  
(method for preparation of lithium cobalt oxides for use as **cathodes**  
of lithium-ion secondary **batteries**)

IT 7440-21-3, Silicon, uses 7440-39-3, Barium, uses  
7440-55-3, Gallium, uses 7440-56-4, Germanium, uses  
7440-70-2, Calcium, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(dopant; method for preparation of lithium cobalt oxides for use as  
**cathodes** of lithium-ion secondary **batteries**)

RN 7440-21-3 HCAPLUS  
CN Silicon (CA INDEX NAME)

Si

RN 7440-39-3 HCAPLUS  
CN Barium (CA INDEX NAME)

Ba

RN 7440-55-3 HCAPLUS  
CN Gallium (CA INDEX NAME)

Ga

RN 7440-56-4 HCAPLUS

CN Germanium (CA INDEX NAME)

Ge

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

IT 39300-70-4, Lithium nickel oxide 39457-42-6, Lithium manganese oxide

RL: DEV (Device component use); USES (Uses)

(method for preparation of lithium cobalt oxides for use as **cathodes** of lithium-ion secondary **batteries**)

RN 39300-70-4 HCAPLUS

CN Lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 39457-42-6 HCAPLUS

CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

IT 52627-24-4P, Cobalt lithium oxide

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(method for preparation of lithium cobalt oxides for use as **cathodes** of lithium-ion secondary **batteries**)

RN 52627-24-4 HCAPLUS

CN Cobalt lithium oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Li	x	7439-93-2

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Gao	1998	8	185	ZHONGGUO YOUSE JINSH	HCAPLUS
Seiko Electronic Compon	1992			EP 0484187 A	HCAPLUS
Tdk Corp	1995			EP 0672622 A	HCAPLUS

Zhaolin, L [1999 181-821416 |JOURNAL OF POWER SOU|

L95 ANSWER 13 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2001:214368 HCAPLUS

DN 134:210489

TI Method and apparatus for **cathode** active mass manufacture for lithium **batteries**

IN Xu, Kaihua

PA Peop. Rep. China

SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 11 pp.

CODEN: CNXXEV

DT **Patent**

LA Chinese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CN 1271185	A	20001025	CN 2000-107325	20000508 <--
PRAI	CN 2000-107325		20000508	<--	

AB The **cathode** active mass, LiCoO<sub>2</sub>, LiMn<sub>2</sub>O<sub>4</sub>, or LiNiO<sub>2</sub>, is manufactured by mist spraying an aqueous 20-200 g/L Li salt solution, an aq 20-200 g/L solution

of Co, Mn, or Ni salt, and a 1-15M alkaline soln at rates of 10-200, 10-200, and 5-200 L/h to a reactor to react and precipitate a multi carbonate or hydroxide crystal, and decomposing the crystal; where the reaction is carried out at 30-70° for 2-100 h under a 20-120 rpm stirring, and the decomposition is carried out at 400±10° for 20-24 h and at 700-900° for 12-15 h.

IC ICM H01M0004-04

ICS C01D0015-02; C04B0035-622

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery cathode** active mass manufIT **Battery cathodes**

(method and manufacture of lithium transition metal oxide **cathode** active mass for secondary lithium **batteries**)

IT 13510-71-9, Yttrium sulfate 34781-33-4, Gallium sulfate

RL: NUU (Other use, unclassified); USES (Uses)

(additives in manufacture of doped lithium transition metal oxide **cathode** active mass for secondary lithium **batteries**)

IT 506-87-6, Ammonium carbonate 1066-33-7, Ammonium bicarbonate 1310-58-3, Potassium hydroxide, uses 1310-73-2, Sodium hydroxide, uses 1336-21-6, Ammonium hydroxide 7785-87-7, Manganese sulfate 7786-81-4, Nickel sulfate 7790-69-4, Lithium nitrate 10124-43-3, Cobalt sulfate 10141-05-6, Cobalt nitrate 10377-48-7, Lithium sulfate 10377-66-9, Manganese nitrate 13138-45-9, Nickel nitrate

RL: NUU (Other use, unclassified); USES (Uses)

(in manufacture lithium transition metal oxide **cathode** active mass for secondary lithium **batteries**)

IT 7439-91-0, Lanthanum, uses 7439-95-4, Magnesium, uses 7439-98-7, Molybdenum, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6, Rhodium, uses 7440-22-4, Silver, uses 7440-53-1, Europium, uses 7440-55-3, Gallium, uses 7440-57-5, Gold, uses 7440-64-4, Ytterbium, uses 7440-65-5, Yttrium, uses 7440-66-6, Zinc, uses 7440-70-2, Calcium, uses 7440-74-6, Indium, uses 14798-03-9, Ammonium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(manufacture of doped lithium transition metal oxide **cathode** active mass for secondary lithium **batteries**)

IT 12031-65-1P, Lithium nickel oxide (LiNiO<sub>2</sub>) 12057-17-9P, Lithium manganese oxide (LiMn<sub>2</sub>O<sub>4</sub>) 12190-79-3P, Lithium cobalt oxide (LiCoO<sub>2</sub>) 113066-91-4P, Cobalt lithium nickel oxide



(Co<sub>0.8</sub>LiNi<sub>0.2</sub>O<sub>2</sub>)

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(method and manufacture of lithium transition metal oxide **cathode** active mass for secondary lithium **batteries**)

IT 7440-55-3, Gallium, uses 7440-70-2, Calcium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(manufacture of doped lithium transition metal oxide **cathode** active mass for secondary lithium **batteries**)

RN 7440-55-3 HCAPLUS

CN Gallium (CA INDEX NAME)

Ga

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

IT 12031-65-1P, Lithium nickel oxide (LiNiO<sub>2</sub>) 12057-17-9P, Lithium manganese oxide (LiMn<sub>2</sub>O<sub>4</sub>) 12190-79-3P, Lithium cobalt oxide (LiCoO<sub>2</sub>) 113066-91-4P, Cobalt lithium nickel oxide (Co<sub>0.8</sub>LiNi<sub>0.2</sub>O<sub>2</sub>)

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(method and manufacture of lithium transition metal oxide **cathode** active mass for secondary lithium **batteries**)

RN 12031-65-1 HCAPLUS

CN Lithium nickel oxide (LiNiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 12057-17-9 HCAPLUS

CN Lithium manganese oxide (LiMn<sub>2</sub>O<sub>4</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS

CN Cobalt lithium oxide (CoLiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

RN 113066-91-4 HCAPLUS  
 CN Cobalt lithium nickel oxide (Co<sub>0.8</sub>LiNi<sub>0.2</sub>O<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.8	7440-48-4
Ni	0.2	7440-02-0
Li	1	7439-93-2

L95 ANSWER 14 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2001:192598 HCAPLUS  
 DN 134:210599  
 TI Long cycle-life alkali metal **battery** with **cathode**  
 coated with a very thin protective film  
 IN Peled, Emanuel; Golodnitsky, Diana; Strauss, Ela  
 PA Ramot University Authority for Applied Research and Industrial Development  
 L, Israel  
 SO U.S., 16 pp.  
 CODEN: USXXAM  
 DT **Patent**  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6203947	B1	20010320	US 1999-280646	19990329 <--
	IL 124007	A	20010826	IL 1998-124007	19980408 <--
PRAI	IL 1998-124007	A	19980408	<--	

AB The present invention provides a **cathode** for use in a secondary **electrochem. cell**, such **cathode** being coated with a very thin, protective film, permeable to ions. The protective film of the **cathode** usually has a thickness of up to about 0.1  $\mu$ m and it provides protection against high voltage charging and overdischarging. The present invention further provides a secondary **electrochem. cell** comprising such a **cathode**.

IC ICM H01M0004-58

INCL 429231950

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

ST **battery cathode** protective film coated

IT Alloys, uses

RL: DEV (Device component use); USES (Uses)  
 (alkali metal; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)

IT Alkali metals, uses

RL: DEV (Device component use); USES (Uses)  
 (alloys; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)

IT Fluoropolymers, uses

Polycarbonates, uses

Polyoxyalkylenes, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
 (binder; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)

IT Polyoxyalkylenes, uses

RL: DEV (Device component use); USES (Uses)  
 (lithium complex; long cycle-life alkali metal **battery** with

- cathode** coated with very thin protective film)
- IT **Battery cathodes**  
Coating materials  
Polymer electrolytes  
(long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT Alkali metals, uses  
RL: DEV (Device component use); USES (Uses)  
(long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 9003-17-2, Polybutadiene 9003-53-6, Polystyrene 24937-79-9, PvdF 25014-41-9, Polyacrylonitrile 25322-68-3, Peo  
RL: TEM (Technical or engineered material use); USES (Uses)  
(binder; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 7429-90-5, Aluminum, uses 7440-02-0, Nickel, uses 12597-68-1, Stainless steel, uses  
RL: DEV (Device component use); USES (Uses)  
(current collector; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 7439-89-6, Iron, uses 7439-95-4, Magnesium, uses 7439-96-5, Manganese, uses 7440-42-8, Boron, uses 7440-48-4, Cobalt, uses 7440-70-2, Calcium, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(dopant; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 1309-48-4, Magnesia, uses 1314-23-4, Zirconia, uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 13463-67-7, Titania, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(filler; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 1309-36-0, Pyrite, uses 1314-62-1, Vanadium pentoxide, uses 7439-93-2, Lithium, uses 7550-35-8, Lithium bromide 7570-02-7, DiVinyl carbonate 10377-51-2, Lithium iodide 10411-26-4, Butyl carbonate 12031-65-1, Lithium nickel oxide linio2 12039-13-3, Titanium disulfide 12057-17-9, Lithium manganese oxide limn2o4 12068-85-8, Iron sulfide fes2 12190-79-3, Cobalt lithium oxide colio2 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 24991-55-7, Polyethylene glycol dimethyl ether 25322-68-3D, Peo, lithium complex 26098-78-2, Ethylene oxide-methylmethacrylate copolymer 90076-65-6 329038-54-2, Vanadium oxide (V8O13)  
RL: DEV (Device component use); USES (Uses)  
(long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 7439-93-2D, Lithium, polyethylene oxide complex, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 33454-82-9, Lithium triflate  
RL: DEV (Device component use); USES (Uses)  
(stainless steel coated with; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective film)
- IT 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(stainless steel coated with; long cycle-life alkali metal **battery** with **cathode** coated with very thin protective

film)  
 IT 7440-70-2, Calcium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (dopant; long cycle-life alkali metal **battery** with  
**cathode** coated with very thin protective film)  
 RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

IT 12031-65-1, Lithium nickel oxide linio2 12057-17-9,  
 Lithium manganese oxide limn2o4 12190-79-3, Cobalt lithium oxide  
 colio2  
 RL: DEV (Device component use); USES (Uses)  
 (long cycle-life alkali metal **battery** with **cathode**  
 coated with very thin protective film)  
 RN 12031-65-1 HCAPLUS  
 CN Lithium nickel oxide (LiNiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 12057-17-9 HCAPLUS  
 CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS  
 CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Carlin	1996			US 5552238	HCAPLUS
Peled	1995			US 5472808	HCAPLUS
Peled	1997	144		J Electrochem, Soc	HCAPLUS
Peled	1983	9	253	Journal of Power Sou	HCAPLUS
Peled	1983	9	253	Journal of Power Sou	HCAPLUS
Schmidt	1980			US 4224394	
Schmidt	1981			US 4298668	
Strauss	1999	2	115	Electrochemical and	HCAPLUS

L95 ANSWER 15 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2001:98769 HCAPLUS  
 DN 134:134117

TI Uniformly doped **battery electrode**, active material for  
**electrode, battery** using the **electrode**, and  
 manufacture of the active material and **battery**

IN Fauteux, Denis G.; Van Buren, Martin

PA Mitsubishi Chemical Corp., Japan

SO Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001035481	A	20010209	JP 2000-202190	20000704 <--
PRAI	US 1999-351775	A	19990712	<--	

AB The active material is manufactured by (1) dissolving transition metal salts, rare earth metal salts, and/or Ga salts in solvents preferably with polymer components to obtain solns., preferably gelatinized, (2) removing solvents to obtain dried homogenized products, and (3) heating the products. The active material obtained by the above method is also claimed. The **battery electrode** comprises a current collector substrate and an active material having crystal structures containing uniformly arranged dopants. The **battery** is manufactured by forming a collector substrate, applying a doped active material, which is obtained by the above method, on the substrate to form an **electrode**, forming another **electrode**, and applying  $\geq 1$  electrolyte to the both **electrodes**. The **battery** obtained by the above method is also claimed. The method gives secondary Li **batteries** with high capacitance, long discharge period, and good coulomb efficiency.

IC ICM H01M0004-02

ICS H01M0004-58; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST doping active material **battery electrode**; lithium

**battery electrode** gallium dopant

IT **Secondary batteries**

(button-type; manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT **Secondary batteries**

(lithium; manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT **Battery cathodes**

(manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); USES (Uses)

(**anode**; manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT 7440-55-3, Gallium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(dopant; manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT 29935-35-1, Lithium hexafluoroarsenate

RL: DEV (Device component use); USES (Uses)

(electrolyte; manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT 12031-65-1P, Lithium nickel oxide (LiNiO<sub>2</sub>)

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT 9002-89-5, Elvanol 50-42  
 RL: NUU (Other use, unclassified); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT 373-02-4, Nickel acetate 546-89-4, Lithium acetate 13494-90-1, Gallium nitrate  
 RL: PEP (Physical, engineering or chemical process); PROC (Process)  
 (manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

IT 7440-55-3, Gallium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (dopant; manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

RN 7440-55-3 HCAPLUS  
 CN Gallium (CA INDEX NAME)

Ga

IT 12031-65-1P, Lithium nickel oxide (LiNiO<sub>2</sub>)  
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (manufacture of uniformly doped active material for **battery electrode** in secondary Li **battery**)

RN 12031-65-1 HCAPLUS  
 CN Lithium nickel oxide (LiNiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

L95 ANSWER 16 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2001:62756 HCAPLUS  
 DN 134:118376  
 TI Lithium ion secondary **battery cathode** active materials, method for evaluation of their thermal stability, and lithium in secondary **batteries**  
 IN Funabashi, Toshihiko; Hamano, Yoshiaki; Ibato, Osamu  
 PA Kawatetsu Mining Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 DT **Patent**  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001023629	A	20010126	JP 1999-197327	19990712 <--
PRAI	JP 1999-197327		19990712	<--	

AB Evaluation of Li Ni mixed oxide **cathode** active materials is carried out by fabrication of the oxides into a secondary **battery**

, charging of the **battery** for deintercalation of Li ion from the oxides, and thermogravimetric anal. of the deintercalated Li Ni oxides. The claimed Li Ni mixed oxide **cathode** active materials show weight decrease, by thermogravimetric anal., limited to  $\Delta W \leq 0.067$ , where  $\Delta W = W_{300} - W_{200}$ ,  $W_{300}$  = weight% decrease at 300°, and  $W_{200}$  = weight% decrease at 200°. The Li Ni mixed oxides may also contain 0.05-0.3 mol Co and/or 0.001-0.1 mol B, Al, Mg, Ca, Sr, Ba, Fe, Ti, Zr, Y, La, and/or Ce, both per 1 mol Ni. Also claimed is lithium ion secondary **batteries** comprising of the claimed **cathodes**. Safe **batteries** are obtained.

IC ICM H01M0004-48  
ICS G01N0005-04; H01M0004-02  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST lithium secondary **battery cathode** active material;  
thermogravimetric analysis lithium nickel oxide **cathode**; nickel  
lithium oxide secondary **battery cathode**; thermal  
stability nickel lithium oxide **cathode**; safety lithium ion  
secondary **battery cathode**  
IT **Battery cathodes**  
Thermal stability  
Thermogravimetric analysis  
(evaluation of thermal stability of lithium nickel mixed oxide  
**cathode** active materials for safe **batteries**)  
IT **Secondary batteries**  
(lithium; evaluation of thermal stability of lithium nickel mixed oxide  
**cathode** active materials for safe **batteries**)  
IT 39300-70-4, Lithium nickel oxide  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(evaluation of thermal stability of lithium nickel mixed oxide  
**cathode** active materials for safe **batteries**)  
IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-91-0, Lanthanum,  
uses 7439-95-4, Magnesium, uses 7440-24-6, Strontium, uses  
7440-32-6, Titanium, uses 7440-39-3, Barium, uses 7440-42-8,  
Boron, uses 7440-45-1, Cerium, uses 7440-48-4, Cobalt, uses  
7440-65-5, Yttrium, uses 7440-67-7, Zirconium, uses 7440-70-2,  
Calcium, uses  
RL: DEV (Device component use); MOA (Modifier or additive use);  
PRP (Properties); USES (Uses)  
(lithium nickel mixed oxides containing; evaluation of thermal stability of  
lithium nickel mixed oxide **cathode** active materials for safe  
**batteries**)  
IT 39300-70-4, Lithium nickel oxide  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(evaluation of thermal stability of lithium nickel mixed oxide  
**cathode** active materials for safe **batteries**)  
RN 39300-70-4 HCAPLUS  
CN Lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

IT 7440-39-3, Barium, uses 7440-70-2, Calcium, uses  
RL: DEV (Device component use); MOA (Modifier or additive use);  
PRP (Properties); USES (Uses)  
(lithium nickel mixed oxides containing; evaluation of thermal stability of  
lithium nickel mixed oxide **cathode** active materials for safe

**batteries)**

RN 7440-39-3 HCAPLUS  
 CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

L95 ANSWER 17 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:705474 HCAPLUS

DN 133:284126

TI Secondary nonaqueous electrolyte **batteries**

IN Nakanishi, Naoya; Sato, Koichi; Fujiwara, Kazuyasu; Noma, Toshiyuki;  
 Yonezu, Ikuo

PA Sanyo Electric Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000277110	A	20001006	JP 1999-78997	19990324 <--
	JP 3615415	B2	20050202		
	US 6551743	B1	20030422	US 2000-534241	20000323 <--
PRAI	JP 1999-78997	A	19990324	<--	

AB The **batteries**, which has to be charged before initial discharge, use a discharged **cathode** active mass having a composition of  $\text{Li}_x\text{Mn}_{2-y-z}\text{Ni}_y\text{MzO}_q$  ( $M = \text{B, Mg, Al, Ti, V, Fe, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, and/or In}$ ;  $1.20 \leq x \leq 1.80$ ;  $y \geq 0.10$ ;  $z \geq 0$ ;  $(y+z) \leq 1.90$ ;  $3.70 \leq q \leq 4.30$ ), during **battery** assembling.

IC ICM H01M0004-58

ICS H01M0004-02; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary **battery cathode** lithium manganese nickel oxide

IT **Battery cathodes**

(comps. of substituted lithium manganese nickel oxide **cathode** active mass for secondary lithium **batteries**)

IT 7429-90-5, Aluminum, uses

RL: MOA (Modifier or additive use); USES (Uses)

(comps. of aluminum substituted lithium manganese nickel oxide **cathode** active mass for secondary lithium **batteries**)

IT 7440-42-8, Boron, uses

RL: MOA (Modifier or additive use); USES (Uses)

(comps. of boron substituted lithium manganese nickel oxide **cathode** active mass for secondary lithium **batteries**)

IT 7440-48-4, Cobalt, uses

RL: MOA (Modifier or additive use); USES (Uses)

(comps. of cobalt substituted lithium manganese nickel oxide **cathode** active mass for secondary lithium **batteries**)



- IT 7440-50-8, Copper, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of copper substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)
- IT 7440-55-3, Gallium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of gallium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)
- IT 7440-74-6, Indium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of indium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)
- IT 7439-89-6, Iron, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of iron substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)
- IT 7439-95-4, Magnesium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of magnesium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)
- IT 7439-98-7, Molybdenum, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of molybdenum substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)
- IT 7440-03-1, Niobium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of niobium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)
- IT 162684-16-4, Lithium manganese nickel oxide 300543-67-3,  
 Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.2</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>)  
 300543-68-4, Cobalt lithium manganese nickel oxide  
 (Co<sub>0.15</sub>Li<sub>1.3</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>) 300543-69-5, Cobalt lithium manganese  
 nickel oxide (Co<sub>0.15</sub>Li<sub>1.4</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>) 300543-70-8, Cobalt  
 lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>)  
 300543-71-9, Cobalt lithium manganese nickel oxide  
 (Co<sub>0.15</sub>Li<sub>1.6</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>) 300543-72-0, Cobalt lithium manganese  
 nickel oxide (Co<sub>0.15</sub>Li<sub>1.7</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>) 300543-73-1, Cobalt  
 lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.8</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>)  
 300543-74-2, Cobalt lithium manganese nickel oxide  
 (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.75</sub>Ni<sub>0.104</sub>) 300543-75-3, Cobalt lithium manganese  
 nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.65</sub>Ni<sub>0.204</sub>) 300543-76-4, Cobalt  
 lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>0.85</sub>Ni<sub>0.4</sub>) 300543-77-5  
 , Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>0.35</sub>Ni<sub>1.504</sub>)  
 300543-78-6, Cobalt lithium manganese nickel oxide  
 (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>0.1</sub>Ni<sub>1.7504</sub>) 300543-79-7, Lithium manganese nickel  
 oxide (Li<sub>1.5</sub>Mn<sub>1.5</sub>Ni<sub>0.504</sub>) 300543-81-1, Cobalt lithium manganese  
 nickel oxide (Co<sub>0.2</sub>Li<sub>1.5</sub>Mn<sub>1.3</sub>Ni<sub>0.504</sub>) 300543-82-2, Cobalt  
 lithium manganese nickel oxide (Co<sub>0.5</sub>Li<sub>1.5</sub>MnNi<sub>0.504</sub>) 300543-83-3  
 , Cobalt lithium manganese nickel oxide (CoLi<sub>1.5</sub>Mn<sub>0.5</sub>Ni<sub>0.504</sub>)  
 300543-84-4, Cobalt lithium manganese nickel oxide  
 (Co<sub>1.4</sub>Li<sub>1.5</sub>Mn<sub>0.1</sub>Ni<sub>0.504</sub>) 300543-85-5, Cobalt lithium manganese  
 nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.35</sub>Ni<sub>0.504.3</sub>) 300543-86-6, Cobalt  
 lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.35</sub>Ni<sub>0.503.7</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (compns. of substituted lithium manganese nickel oxide **cathode**  
 active mass for secondary lithium **batteries**)
- IT 7440-32-6, Titanium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of titanium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)

IT 7440-62-2, Vanadium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of vanadium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)

IT 7440-65-5, Yttrium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of yttrium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)

IT 7440-66-6, Zinc, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of zinc substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)

IT 7440-67-7, Zirconium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (compns. of zirconium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)

IT 7440-55-3, Gallium, uses  
 RL: **MOA (Modifier or additive use); USES (Uses)**  
 (compns. of gallium substituted lithium manganese nickel oxide  
**cathode** active mass for secondary lithium **batteries**)

RN 7440-55-3 HCAPLUS  
 CN Gallium (CA INDEX NAME)

Ga

IT 162684-16-4, Lithium manganese nickel oxide 300543-67-3,  
 Cobalt lithium manganese nickel oxide (Co0.15Li1.2Mn1.35Ni0.5O4)  
 300543-68-4, Cobalt lithium manganese nickel oxide  
 (Co0.15Li1.3Mn1.35Ni0.5O4) 300543-69-5, Cobalt lithium manganese  
 nickel oxide (Co0.15Li1.4Mn1.35Ni0.5O4) 300543-70-8, Cobalt  
 lithium manganese nickel oxide (Co0.15Li1.5Mn1.35Ni0.5O4)  
 300543-71-9, Cobalt lithium manganese nickel oxide  
 (Co0.15Li1.6Mn1.35Ni0.5O4) 300543-72-0, Cobalt lithium manganese  
 nickel oxide (Co0.15Li1.7Mn1.35Ni0.5O4) 300543-73-1, Cobalt  
 lithium manganese nickel oxide (Co0.15Li1.8Mn1.35Ni0.5O4)  
 300543-74-2, Cobalt lithium manganese nickel oxide  
 (Co0.15Li1.5Mn1.75Ni0.1O4) 300543-75-3, Cobalt lithium manganese  
 nickel oxide (Co0.15Li1.5Mn1.65Ni0.2O4) 300543-76-4, Cobalt  
 lithium manganese nickel oxide (Co0.15Li1.5Mn0.85NiO4) 300543-77-5  
 , Cobalt lithium manganese nickel oxide (Co0.15Li1.5Mn0.35Ni1.5O4)  
 300543-78-6, Cobalt lithium manganese nickel oxide  
 (Co0.15Li1.5Mn0.1Ni1.75O4) 300543-79-7, Lithium manganese nickel  
 oxide (Li1.5Mn1.5Ni0.5O4) 300543-81-1, Cobalt lithium manganese  
 nickel oxide (Co0.2Li1.5Mn1.3Ni0.5O4) 300543-82-2, Cobalt  
 lithium manganese nickel oxide (Co0.5Li1.5MnNi0.5O4) 300543-83-3  
 , Cobalt lithium manganese nickel oxide (CoLi1.5Mn0.5Ni0.5O4)  
 300543-84-4, Cobalt lithium manganese nickel oxide  
 (Co1.4Li1.5Mn0.1Ni0.5O4) 300543-85-5, Cobalt lithium manganese  
 nickel oxide (Co0.15Li1.5Mn1.35Ni0.5O4.3) 300543-86-6, Cobalt  
 lithium manganese nickel oxide (Co0.15Li1.5Mn1.35Ni0.5O3.7)  
 RL: DEV (Device component use); USES (Uses)  
 (compns. of substituted lithium manganese nickel oxide **cathode**  
 active mass for secondary lithium **batteries**)

RN 162684-16-4 HCAPLUS  
 CN Lithium manganese nickel oxide (CA INDEX NAME)

Component	Ratio	Component
		Registry Number

Component	Ratio	Component Registry Number
O	x	17778-80-2
Ni	x	7440-02-0
Mn	x	7439-96-5
Li	x	7439-93-2

RN 300543-67-3 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.15Li1.2Mn1.35Ni0.5O4) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.2	7439-93-2

RN 300543-68-4 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.15Li1.3Mn1.35Ni0.5O4) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.3	7439-93-2

RN 300543-69-5 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.15Li1.4Mn1.35Ni0.5O4) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.4	7439-93-2

RN 300543-70-8 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.15Li1.5Mn1.35Ni0.5O4) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.5	7439-93-2

RN 300543-71-9 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.15Li1.6Mn1.35Ni0.5O4) (9CI)

(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.6	7439-93-2

RN 300543-72-0 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.7</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.7	7439-93-2

RN 300543-73-1 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.8</sub>Mn<sub>1.35</sub>Ni<sub>0.504</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.8	7439-93-2

RN 300543-74-2 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.75</sub>Ni<sub>0.104</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.1	7440-02-0
Mn	1.75	7439-96-5
Li	1.5	7439-93-2

RN 300543-75-3 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.65</sub>Ni<sub>0.204</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	0.2	7440-02-0

Mn	1.65	7439-96-5
Li	1.5	7439-93-2

RN 300543-76-4 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>0.85</sub>NiO<sub>4</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	1	7440-02-0
Mn	0.85	7439-96-5
Li	1.5	7439-93-2

RN 300543-77-5 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>0.35</sub>Ni<sub>1.5</sub>O<sub>4</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	1.5	7440-02-0
Mn	0.35	7439-96-5
Li	1.5	7439-93-2

RN 300543-78-6 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>0.1</sub>Ni<sub>1.75</sub>O<sub>4</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.15	7440-48-4
Ni	1.75	7440-02-0
Mn	0.1	7439-96-5
Li	1.5	7439-93-2

RN 300543-79-7 HCAPLUS

CN Lithium manganese nickel oxide (Li<sub>1.5</sub>Mn<sub>1.5</sub>NiO<sub>5</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Ni	0.5	7440-02-0
Mn	1.5	7439-96-5
Li	1.5	7439-93-2

RN 300543-81-1 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>Li<sub>1.5</sub>Mn<sub>1.3</sub>NiO<sub>5</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
-----------	-------	------------------------------

O		4		17778-80-2
Co		0.2		7440-48-4
Ni		0.5		7440-02-0
Mn		1.3		7439-96-5
Li		1.5		7439-93-2

RN 300543-82-2 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.5</sub>Li<sub>1.5</sub>MnNi<sub>0.504</sub>) (9CI) (CA INDEX NAME)

Component		Ratio		Component Registry Number
=====				
O		4		17778-80-2
Co		0.5		7440-48-4
Ni		0.5		7440-02-0
Mn		1		7439-96-5
Li		1.5		7439-93-2

RN 300543-83-3 HCAPLUS

CN Cobalt lithium manganese nickel oxide (CoLi<sub>1.5</sub>Mn<sub>0.5</sub>Ni<sub>0.504</sub>) (9CI) (CA INDEX NAME)

Component		Ratio		Component Registry Number
=====				
O		4		17778-80-2
Co		1		7440-48-4
Ni		0.5		7440-02-0
Mn		0.5		7439-96-5
Li		1.5		7439-93-2

RN 300543-84-4 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>1.4</sub>Li<sub>1.5</sub>Mn<sub>0.1</sub>Ni<sub>0.504</sub>) (9CI) (CA INDEX NAME)

Component		Ratio		Component Registry Number
=====				
O		4		17778-80-2
Co		1.4		7440-48-4
Ni		0.5		7440-02-0
Mn		0.1		7439-96-5
Li		1.5		7439-93-2

RN 300543-85-5 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.35</sub>Ni<sub>0.504.3</sub>) (9CI) (CA INDEX NAME)

Component		Ratio		Component Registry Number
=====				
O		4.3		17778-80-2
Co		0.15		7440-48-4
Ni		0.5		7440-02-0
Mn		1.35		7439-96-5
Li		1.5		7439-93-2

RN 300543-86-6 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>Li<sub>1.5</sub>Mn<sub>1.35</sub>Ni<sub>0.503.7</sub>) (9CI)

## (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	3.7	17778-80-2
Co	0.15	7440-48-4
Ni	0.5	7440-02-0
Mn	1.35	7439-96-5
Li	1.5	7439-93-2

L95 ANSWER 18 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2000:643401 HCAPLUS  
 DN 133:210708  
 TI Secondary nonaqueous electrolyte **batteries** and method for  
 operating the **batteries**  
 IN Tateishi, Masaki  
 PA Hitachi Maxell, Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 13 pp.  
 CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	-----
PI	JP 2000251894	A	20000914	JP 1999-366701	19991224 <--
PRAI	JP 1998-377463	A	19981229	<--	
AB	The <b>batteries</b> have open circuit voltage $\geq 3$ V, and use spherical or ellipsoidal <b>cathode</b> active mass particles of spinel type $\text{Li}_x\text{Mn}_{y/4-z}\text{O}_4$ ; where $0.48 \leq (y/4 - z) \leq 0.52$ , $0 < z \leq 0.15$ , and x varies between 0.10 and 0.95 during the charge and discharge of the <b>battery</b> . Mn in the <b>cathode</b> active mass may be replaced by Al, Cu, Fe, Ni, Co, Cr, B, and/or Si up to 10 mol% of Mn. The <b>batteries</b> are operated by controlling the x within the defined range and retaining an open circuit voltage $\geq 3$ V.				
IC	ICM H01M0004-58 ICS H01M0004-02; H01M0010-40				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	secondary <b>battery cathode</b> lithium manganese oxide compn; voltage range secondary lithium <b>battery</b> operation				
IT	<b>Battery cathodes</b> (controlled <b>cathode</b> active mass composition change range in operation of secondary lithium <b>batteries</b> )				
IT	<b>Secondary batteries</b> (lithium; controlled <b>cathode</b> active mass composition change range and open circuit voltage in operation of secondary lithium <b>batteries</b> )				
IT	253878-84-1, Lithium manganese oxide (Li1.01Mn1.99O3.88) 290300-35-5, Lithium manganese borate oxide (Li1.03Mn1.92(BO3)0.05O3.78) RL: DEV (Device component use); PRP (Properties); USES (Uses) (controlled <b>cathode</b> active mass composition change range and open circuit voltage in operation of secondary lithium <b>batteries</b> )				
IT	7439-93-2, Lithium, miscellaneous RL: MSC (Miscellaneous) (controlled lithium content variation range in operation of secondary lithium <b>batteries</b> )				
IT	7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-02-0, Nickel, uses 7440-21-3, Silicon, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses				

RL: **MOA (Modifier or additive use)**; USES (Uses)  
(substituents in lithium manganese oxide **cathode** active mass  
for secondary lithium **batteries**)

IT **253878-84-1**, Lithium manganese oxide (Li1.01Mn1.99O3.88)

RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(controlled **cathode** active mass composition change range and open  
circuit voltage in operation of secondary lithium **batteries**)

RN 253878-84-1 HCAPLUS

CN Lithium manganese oxide (Li1.01Mn1.99O3.88) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	3.88	17778-80-2
Mn	1.99	7439-96-5
Li	1.01	7439-93-2

IT **7440-21-3**, Silicon, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)  
(substituents in lithium manganese oxide **cathode** active mass  
for secondary lithium **batteries**)

RN 7440-21-3 HCAPLUS

CN Silicon (CA INDEX NAME)

Si

L95 ANSWER 19 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:513424 HCAPLUS

DN 133:107439

TI Spinel type oxide **cathode** for nonaqueous electrolyte  
**battery** with lithium intercalating **anode**

IN Narukawa, Satoshi; Imachi, Naoko; Nakamizo, Shiori

PA Sanyo Electric Co., Ltd., Japan

SO Eur. Pat. Appl., 28 pp.

CODEN: EPXXDW

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	-----
PI	EP 1022792	A1	20000726	EP 2000-101444	20000125 <--
	EP 1022792	B1	20061004		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 2000215884	A	20000804	JP 1999-16141	19990125 <--
	JP 3754218	B2	20060308		
	TW 431012	B	20010421	TW 1999-88120664	19991126 <--
	KR 2000052412	A	20000825	KR 1999-54801	19991203 <--
	CN 1262532	A	20000809	CN 1999-126373	19991217 <--
	US 6534216	B1	20030318	US 2000-490535	20000125 <--
	HK 1028491	A1	20061110	HK 2000-107741	20001201 <--
PRAI	JP 1999-16141	A	19990125	<--	

AB A **cathode** for a nonaq. **electrolyte cell** is  
comprised of a mixture of spinel-type lithium manganese oxide represented by  
a formula  $\text{Li1}+\text{xMn2-yO4}$  (provided that the atomic ratio of lithium and  
manganese is determined to be  $0.56 \leq \text{Li/Mn} [(1+\text{x})/(2-\text{y})] \leq 0.62$ ,  
 $\text{x}$  is determined to be  $0.2 \leq \text{x} \leq 0.2$ , and  $\text{y}$  is determined to be  $\text{y}$



$\leq 1.0$ ) and at least either one of lithium cobalt oxide represented by a formula  $\text{Li}_{1+z}\text{CoO}_2$  (provided that  $z$  is determined to be  $0.5 \leq z \leq 0.5$ ) or lithium nickel oxide represented by a formula  $\text{Li}_{1+z}\text{NiO}_2$  (provided that  $z$  is determined to be  $0.5 \leq z \leq 0.5$ ), and wherein in the case that the weight of spinel-type manganese oxide is defined as  $A$  and that the weight of the lithium cobalt oxide or lithium nickel oxide is defined as  $B$ , the amount of lithium cobalt oxide or lithium nickel oxide is determined to be  $0.05 \leq B/(A + B) < 0.2$ .

- IC ICM **H01M0004-48**  
ICS **H01M0010-40**; C01G0045-02
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST lithium manganese oxide **cathode battery**; cobalt  
lithium oxide **cathode battery**; nickel lithium oxide  
**cathode battery**
- IT **Secondary batteries**  
(lithium; spinel type oxide **cathode** for nonaq. electrolyte  
**battery** with lithium intercalating **anode**)
- IT **Battery anodes**  
**Battery cathodes**  
Polymer electrolytes  
(spinel type oxide **cathode** for nonaq. electrolyte  
**battery** with lithium intercalating **anode**)
- IT Fluoropolymers, uses  
Polycarbonates, uses  
Polyoxyalkylenes, uses  
RL: DEV (Device component use); USES (Uses)  
(spinel type oxide **cathode** for nonaq. electrolyte  
**battery** with lithium intercalating **anode**)
- IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 616-38-6,  
Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 7791-03-9, Lithium  
perchlorate 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium  
hexafluorophosphate 24937-79-9, PvdF 25014-41-9, Polyacrylonitrile  
25322-68-3, Polyethylene glycol **39300-70-4**, Lithium nickel oxide  
**39457-42-6**, Lithium manganese oxide **52627-24-4**, Cobalt  
lithium oxide 132843-44-8 **144973-00-2**, Cobalt lithium oxide  
 $\text{CoLi}_{0.5-1.5}\text{O}_2$  **272128-41-3**, Lithium manganese oxide  
 $\text{Li}_{0.8-1.2}\text{Mn}_2\text{O}_4$  **282725-14-8**, Lithium nickel oxide ( $\text{Li}_{0.5-1.5}\text{NiO}_2$ )  
RL: DEV (Device component use); USES (Uses)  
(spinel type oxide **cathode** for nonaq. electrolyte  
**battery** with lithium intercalating **anode**)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-95-4, Magnesium,  
uses 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses  
7440-02-0, Nickel, uses 7440-03-1, Niobium, uses 7440-24-6, Strontium,  
uses 7440-31-5, Tin, uses 7440-32-6, Titanium, uses 7440-47-3,  
Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses  
7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses 7440-67-7, Zirconium,  
uses **7440-70-2**, Calcium, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(spinel type oxide **cathode** for nonaq. electrolyte  
**battery** with lithium intercalating **anode**)
- IT **39300-70-4**, Lithium nickel oxide **39457-42-6**, Lithium  
manganese oxide **52627-24-4**, Cobalt lithium oxide  
**144973-00-2**, Cobalt lithium oxide  $\text{CoLi}_{0.5-1.5}\text{O}_2$   
**272128-41-3**, Lithium manganese oxide  $\text{Li}_{0.8-1.2}\text{Mn}_2\text{O}_4$   
**282725-14-8**, Lithium nickel oxide ( $\text{Li}_{0.5-1.5}\text{NiO}_2$ )  
RL: DEV (Device component use); USES (Uses)  
(spinel type oxide **cathode** for nonaq. electrolyte  
**battery** with lithium intercalating **anode**)
- RN **39300-70-4** HCAPLUS

CN Lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 39457-42-6 HCAPLUS

CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

RN 52627-24-4 HCAPLUS

CN Cobalt lithium oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Li	x	7439-93-2

RN 144973-00-2 HCAPLUS

CN Cobalt lithium oxide (CoLi<sub>0.5-1.5</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	0.5 - 1.5	7439-93-2

RN 272128-41-3 HCAPLUS

CN Lithium manganese oxide (Li<sub>0.8-1.2</sub>Mn<sub>2</sub>O<sub>4</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	0.8 - 1.2	7439-93-2

RN 282725-14-8 HCAPLUS

CN Lithium nickel oxide (Li<sub>0.5-1.5</sub>NiO<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	0.5 - 1.5	7439-93-2

IT 7440-70-2, Calcium, uses

RL: **MOA (Modifier or additive use); USES (Uses)**  
 (spinel type oxide **cathode** for nonaq. electrolyte  
**battery** with lithium intercalating **anode**)

RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Anon	1998	1998		PATENT ABSTRACTS OF	
Anon	1998	1998		PATENT ABSTRACTS OF	
Fuji Electrochem Co Ltd	1998			JP 10112318 A	HCAPLUS
Motorola Inc	1997			WO 9724773 A	HCAPLUS
Polystor Corp	1997			WO 9701191 A	HCAPLUS
Polystor Corp	1998			WO 9824131 A	
Pynenburg, R	1995			US 5429890 A	HCAPLUS
Yuasa Corp	1998			JP 10092430 A	HCAPLUS

L95 ANSWER 20 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:493254 HCAPLUS

DN 133:107408

TI Process for producing lithium secondary **battery**

IN Kaneda, Junya; Watanabe, Noriyuki; Aono, Yasuhisa; Takeuchi, Seiji;  
 Muranaka, Yasushi; Takei, Kouichi

PA Hitachi, Ltd., Japan; Hitachi Chemical Company, Ltd.

SO Eur. Pat. Appl., 25 pp.

CODEN: EPXXDW

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1020944	A2	20000719	EP 2000-100127	20000107 <--
	EP 1020944	A3	20031217		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	US 6524749	B1	20030225	US 2000-482644	20000113 <--
	KR 2000053488	A	20000825	KR 2000-1634	20000114 <--
	JP 2000268824	A	20000929	JP 2000-10222	20000114 <--
	US 2003091901	A1	20030515	US 2002-331648	20021231 <--
PRAI	JP 1999-7380	A	19990114	<--	
	US 2000-482644	A3	20000113	<--	

AB A lithium secondary **battery**, which comprises a pos.  
**electrode**, a neg. **electrode** containing a lithium  
 ion-storable/dischargeable neg. **electrode**-active material and a  
 lithium ion conductive, nonaq. electrolytic solution or polymer electrolyte  
 can have distinguished charging/discharging characteristics and a higher  
 safety, when the neg. **electrode** material contains particles  
 comprising carbonaceous materials and at least one of elements capable of  
 forming a compound with Li; the elements have a m.p. of at least 900°  
 and a thermal expansion coefficient of not more than 9 ppm/K at room  
 temperature; the  
 particles are embedded in a plurality of layers of the carbonaceous  
 materials; the particles being subjected to a mech. treatment to make  
 particle sizes of the particles smaller than the initial particle size in

advance.

IC ICM H01M0010-40  
ICS H01M0004-02; H01M0004-58  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST lithium **battery** fabrication; safety lithium **battery**  
IT **Secondary batteries**  
(lithium; process for producing lithium secondary **battery**)  
IT **Battery anodes**  
Coal tar pitch  
Petroleum pitch  
(process for producing lithium secondary **battery**)  
IT Carbonaceous materials (technological products)  
RL: DEV (Device component use); USES (Uses)  
(process for producing lithium secondary **battery**)  
IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(process for producing lithium secondary **battery**)  
IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6,  
Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 7429-90-5,  
Aluminum, uses 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses  
**12057-17-9**, Lithium manganese oxide  $\text{LiMn}_2\text{O}_4$  **12190-79-3**,  
Cobalt lithium oxide  $\text{CoLiO}_2$  14283-07-9, Lithium tetrafluoroborate  
21324-40-3, Lithium hexafluorophosphate **99637-69-1**, Lithium  
nickel oxide  $\text{LiNi}_2\text{O}_4$   
RL: DEV (Device component use); USES (Uses)  
(process for producing lithium secondary **battery**)  
IT **7440-21-3**, Silicon, uses **7440-56-4**, Germanium, uses  
RL: DEV (Device component use); MOA (Modifier or additive use);  
USES (Uses)  
(process for producing lithium secondary **battery**)  
IT 7440-50-8, Copper, uses 24937-79-9, PvdF  
RL: TEM (Technical or engineered material use); USES (Uses)  
(process for producing lithium secondary **battery**)  
IT **12057-17-9**, Lithium manganese oxide  $\text{LiMn}_2\text{O}_4$  **12190-79-3**,  
Cobalt lithium oxide  $\text{CoLiO}_2$  **99637-69-1**, Lithium nickel oxide  
 $\text{LiNi}_2\text{O}_4$   
RL: DEV (Device component use); USES (Uses)  
(process for producing lithium secondary **battery**)  
RN 12057-17-9 HCAPLUS  
CN Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ ) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS  
CN Cobalt lithium oxide ( $\text{CoLiO}_2$ ) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

RN 99637-69-1 HCAPLUS  
CN Lithium nickel oxide ( $\text{LiNi}_2\text{O}_4$ ) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Ni	2	7440-02-0
Li	1	7439-93-2

IT 7440-21-3, Silicon, uses 7440-56-4, Germanium, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use);  
 USES (Uses)  
 (process for producing lithium secondary battery)  
 RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

RN 7440-56-4 HCAPLUS  
 CN Germanium (CA INDEX NAME)

Ge

L95 ANSWER 21 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2000:291419 HCAPLUS  
 DN 132:296143  
 TI Micro-electrochemical energy storage cells  
 IN Nathan, Menachem; Peled, Emanuel; Haronian, Dan  
 PA Ramot University Authority for Applied Research & Industrial Development,  
 Israel  
 SO PCT Int. Appl., 22 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2000025378	A1	20000504	WO 1999-IL537	19991013 <--
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU,				
CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL,				
IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,				
MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,				
SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM,				
AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE,				
DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF,				
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6197450	B1	20010306	US 1998-176321	19981022 <--
AU 9961194	A1	20000515	AU 1999-61194	19991013 <--
EP 1145348	A1	20011017	EP 1999-947833	19991013 <--
EP 1145348	B1	20020918		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				
IE, SI, LT, LV, FI, RO				
AT 224587	T	20021015	AT 1999-947833	19991013 <--
PRAI US 1998-176321	A	19981022	<--	
WO 1999-IL537	W	19991013	<--	

AB Thin-film micro-electrochem. energy storage cells (MEESC) such as **microbatteries** and double-layer capacitors comprise two thin layer **electrodes**, an intermediate thin layer of a solid electrolyte and optionally, a fourth thin current collector layer; the layers being deposited in sequence on a surface of a substrate. The MEESC is characterized in that the substrate is provided with a plurality of through cavities of arbitrary shape, with high aspect ratio. By using the substrate volume, an increase in the total **electrode** area per volume is accomplished.

IC ICM **H01M0006-40**

ICS **H01M0010-36**; H01G0009-00; H05K0001-16; H01L0023-495

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 76

ST **battery** micro thin layer; double layer capacitor thin layer

IT **Secondary batteries**

(lithium, micro-; micro-electrochem. energy storage cells)

IT 7429-90-5, Aluminum, uses 7439-95-4, Magnesium, uses 7440-24-6, Strontium, uses **7440-39-3**, Barium, uses 7440-42-8, Boron, uses **7440-70-2**, Calcium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(electrolyte doped with; micro-electrochem. energy storage cells)

IT 96-49-1, Ethylene carbonate 554-13-2, Lithium carbonate 1314-62-1, Vanadium pentoxide, uses 1317-40-4, Copper sulfide cus 1344-28-1, Alumina, uses 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 11126-15-1, Lithium vanadium oxide **12031-65-1**, Lithium nickel oxide linio2 12039-13-3, Titanium sulfide tis2 12054-07-8, Copper sulfide cus2 **12057-17-9**, Lithium manganese oxide limn2o4 12137-52-9, Vanadium oxide v3o8 **12190-79-3**, Cobalt lithium oxide colio2 12680-08-9, Lithium titanium sulfide 33454-82-9D, Lithium trifluoromethanesulfonate, polyethylene oxide complex 39448-96-9, Graphite lithium 132843-44-8 203402-92-0, Lithium nitride phosphate 264142-78-1, Copper lithium sulfide

RL: DEV (Device component use); USES (Uses)

(micro-electrochem. energy storage cells)

IT **7440-39-3**, Barium, uses **7440-70-2**, Calcium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(electrolyte doped with; micro-electrochem. energy storage cells)

RN 7440-39-3 HCAPLUS

CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

IT **12031-65-1**, Lithium nickel oxide linio2 **12057-17-9**, Lithium manganese oxide limn2o4 **12190-79-3**, Cobalt lithium oxide colio2

RL: DEV (Device component use); USES (Uses)

(micro-electrochem. energy storage cells)

RN **12031-65-1** HCAPLUS

CN Lithium nickel oxide (LiNiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 12057-17-9 HCAPLUS

CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS

CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

## RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Anon	1997	1997		PATENT ABSTRACTS OF	
Eurofarad	1988			FR 2606207 A	
Hitchens, G	1996			US 5545308 A	HCAPLUS
Ici Plc	1989			EP 0331342 A	HCAPLUS
Miyabayashi, T	1991			US 5019468 A	
Nounou, F	1995			US 5421083 A	HCAPLUS
Oki Electric Ind Co Ltd	1997			JP 09186461 A	
Rech Applic Electrochim	1985			FR 2550015 A	HCAPLUS
Saunders, R	1979			US 4173745 A	
Schroff Gmbh	1986			GB 2161988 A	
Thomson Hybrides Microo	1989			FR 2621174 A	

L95 ANSWER 22 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:290751 HCAPLUS

DN 132:296134

TI Preparation of manganese oxide, lithium manganese complex oxide and  
cobalt-coated lithium manganese complex oxide **cathodes** of  
secondary **battery**

IN Fujino, Shoichi; Takahama, Hiroshi; Hatatani, Mitsuaki; Sugiyama,  
Norimiki; Sadamura, Hideaki

PA Toda Kogyo Corporation, Japan

SO Eur. Pat. Appl., 27 pp.

CODEN: EPXXDW

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 997956	A1	20000503	EP 1999-120873	19991027 <--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,  
IE, SI, LT, LV, FI, RO

JP 2000128540	A	20000509	JP 1998-305321	19981027 <--
JP 2000169152	A	20000620	JP 1998-351021	19981210 <--
US 6428766	B1	20020806	US 1999-422859	19991025 <--
KR 2000029333	A	20000525	KR 1999-46711	19991026 <--
US 2002177002	A1	20021128	US 2002-86730	20020304 <--
US 2002197202	A1	20021226	US 2002-166409	20020611 <--
US 6551571	B2	20030422		
PRAI JP 1998-305321	A	19981027	<--	
JP 1998-351021	A	19981210	<--	
US 1999-422859	A3	19991025	<--	

AB A Mn oxide which has a Ca and/or Mg content of 0.01 to 2.5 mol% based on the moles of Mn, a lithium manganese complex oxide using the Mn oxide, and a Co coated lithium manganese complex oxide are disclosed. These provide a particularly high discharge capacity and are useful as active material of a **cathode** for the improvement of cycle characteristics of a secondary **battery** with a nonaq. electrolyte. The preparation of the manganese oxide by reacting NaOH with a Mn salt to which Ca or Mg salt is added, supplying an oxygen containing gas and heating the solution, filtering and drying is also disclosed.

IC ICM **H01M0004-50**  
ICS C01G0045-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 49

ST **battery cathode** cobalt coated lithium manganese oxide

IT **Secondary batteries**  
(lithium; preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT **Battery cathodes**  
(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT 11129-60-5P, Manganese oxide  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT 12162-79-7P, Lithium manganese oxide limno2 **39457-42-6P**, Lithium manganese oxide **214536-41-1P**, Cobalt lithium manganese oxide  
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT 7439-95-4, Magnesium, uses **7440-70-2**, Calcium, uses  
RL: **MOA (Modifier or additive use)**; USES (Uses)  
(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT 7440-48-4, Cobalt, uses 11104-61-3, Cobalt oxide  
RL: **MOA (Modifier or additive use)**; TEM (Technical or engineered material use); USES (Uses)  
(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT 554-13-2, Lithium carbonate 7487-88-9, Magnesium sulfate, reactions



7785-87-7, Manganese sulfate 10124-37-5, Calcium nitrate

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT 18933-05-6P, Manganese(II) hydroxide

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

IT 39457-42-6P, Lithium manganese oxide 214536-41-1P,

Cobalt lithium manganese oxide

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

RN 39457-42-6 HCAPLUS

CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

RN 214536-41-1 HCAPLUS

CN Cobalt lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Mn	x	7439-96-5
Li	x	7439-93-2

IT 7440-70-2, Calcium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(preparation of manganese oxide, lithium manganese complex oxide and cobalt-coated lithium manganese complex oxide **cathodes** of secondary **battery**)

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

#### RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
Daniel, I	1999			WO 9900861 A	HCAPLUS
Merck Patent Gmbh	1999			DE 19727611 A	HCAPLUS
Technology Finance Corp	1994			GB 2270195 A	HCAPLUS
Tosoh Corp	1994			EP 0581290 A	HCAPLUS
Varta, B	1997			EP 0802573 A	HCAPLUS

L95 ANSWER 23 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2000:274689 HCAPLUS  
 DN 132:267648  
 TI Secondary nonaqueous electrolyte **batteries**  
 IN Ito, Hiroichi; Aoki, Takashi; Nakamitsu, Kazuhiro  
 PA Gs Melcotec K. K., Japan  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF

DT **Patent**  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000123834	A	20000428	JP 1998-288495	19981009 <--
PRAI	JP 1998-288495		19981009 <--		
AB	The <b>batteries</b> use Li intercalating <b>anodes</b> and $\text{Li}_{1-x}\text{CoMg}_x\text{O}_2$ ( $0 < x \leq 0.05$ ) or $\text{Li}_{1-y}\text{CoCa}_y\text{O}_2$ ( $0 < y \leq 0.002$ ) solid solution as <b>cathode</b> active mass. The <b>cathode</b> active mass may also contain $\text{Fe} \leq 0.1$ , $\text{Cu} \leq 0.1$ , $\text{Na} \leq 0.5$ , $\text{Si} \leq 0.5$ , and $\text{Ni} \leq 0.5\%$ .				
IC	ICM H01M0004-58 ICS H01M0004-02; H01M0010-40				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	<b>battery</b> lithium cobalt oxide <b>cathode</b> compn; magnesium lithium cobalt oxide <b>cathode battery</b> ; calcium lithium cobalt oxide <b>cathode battery</b>				
IT	<b>Battery cathodes</b> (compns. of substituted lithium cobaltate for <b>cathodes</b> in secondary lithium <b>batteries</b> )				
IT	7439-95-4, Magnesium, uses 7440-70-2, Calcium, uses RL: MOA (Modifier or additive use); USES (Uses) (compns. of calcium and magnesium substituted lithium cobaltate for <b>cathodes</b> in secondary lithium <b>batteries</b> )				
IT	12190-79-3, Cobalt lithium oxide ( $\text{CoLiO}_2$ ) 263571-08-0, Cobalt lithium magnesium oxide ( $\text{CoLi}_{0.99}\text{Mg}_{0.01}\text{O}_2$ ) 263571-09-1, Cobalt lithium magnesium oxide ( $\text{CoLi}_{0.98}\text{Mg}_{0.02}\text{O}_2$ ) 263571-10-4, Cobalt lithium magnesium oxide ( $\text{CoLi}_{0.96}\text{Mg}_{0.04}\text{O}_2$ ) 263571-11-5, Cobalt lithium magnesium oxide ( $\text{CoLi}_{0.9}\text{Mg}_{0.1}\text{O}_2$ ) RL: DEV (Device component use); USES (Uses) (compns. of substituted lithium cobaltate for <b>cathodes</b> in secondary lithium <b>batteries</b> )				
IT	7439-89-6, Iron, miscellaneous 7440-02-0, Nickel, miscellaneous 7440-21-3, Silicon, miscellaneous 7440-23-5, Sodium, miscellaneous 7440-50-8, Copper, miscellaneous RL: MSC (Miscellaneous) (controlled impurities in substituted lithium cobaltate for <b>cathodes</b> in secondary lithium <b>batteries</b> )				
IT	7440-70-2, Calcium, uses RL: MOA (Modifier or additive use); USES (Uses) (compns. of calcium and magnesium substituted lithium cobaltate for <b>cathodes</b> in secondary lithium <b>batteries</b> )				
RN	7440-70-2 HCAPLUS				
CN	Calcium (CA INDEX NAME)				

Ca

IT 12190-79-3, Cobalt lithium oxide ( $\text{CoLiO}_2$ ) 263571-08-0,

Cobalt lithium magnesium oxide (CoLi0.99Mg0.01O2) 263571-09-1,  
 Cobalt lithium magnesium oxide (CoLi0.98Mg0.02O2) 263571-10-4,  
 Cobalt lithium magnesium oxide (CoLi0.96Mg0.04O2) 263571-11-5,  
 Cobalt lithium magnesium oxide (CoLi0.9Mg0.1O2)

RL: DEV (Device component use); USES (Uses)

(comps. of substituted lithium cobaltate for **cathodes** in  
 secondary lithium **batteries**)

RN 12190-79-3 HCAPLUS

CN Cobalt lithium oxide (CoLiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

RN 263571-08-0 HCAPLUS

CN Cobalt lithium magnesium oxide (CoLi0.99Mg0.01O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Mg	0.01	7439-95-4
Li	0.99	7439-93-2

RN 263571-09-1 HCAPLUS

CN Cobalt lithium magnesium oxide (CoLi0.98Mg0.02O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Mg	0.02	7439-95-4
Li	0.98	7439-93-2

RN 263571-10-4 HCAPLUS

CN Cobalt lithium magnesium oxide (CoLi0.96Mg0.04O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Mg	0.04	7439-95-4
Li	0.96	7439-93-2

RN 263571-11-5 HCAPLUS

CN Cobalt lithium magnesium oxide (CoLi0.9Mg0.1O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Mg	0.1	7439-95-4
Li	0.9	7439-93-2

L95 ANSWER 24 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 2000:129702 HCAPLUS  
 DN 132:173355  
 TI Electrophotographic toner containing meadowfoam derivative, preventing background fog and solid area image defects and apparatus  
 IN Yuasa, Yasuhito  
 PA Matsushita Electric Industrial Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 32 pp.  
 CODEN: JKXXAF  
 DT **Patent**  
 LA Japanese  
 FAN.CNT 6

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000056501	A	20000225	JP 1998-223942	19980807 <--
	JP 3899692	B2	20070328		
	CN 1246659	A	20000308	CN 1999-111474	19990625 <--
	CN 1664708	A	20050907	CN 2005-10004341	19990625 <--
	US 2001000743	A1	20010503	US 2001-754161	20010104 <--
	US 6270937	B2	20010807		
	US 2001002305	A1	20010531	US 2001-754157	20010104 <--
	US 6326116	B2	20011204		
	US 2002086229	A1	20020704	US 2001-976884	20011012 <--
	US 6432599	B2	20020813		
PRAI	JP 1998-178545	A	19980625	<--	
	JP 1998-223940	A	19980807	<--	
	JP 1998-223941	A	19980807	<--	
	JP 1998-223942	A	19980807	<--	
	JP 1998-233948	A	19980820	<--	
	US 1999-337843	B3	19990621	<--	
	CN 1999-111474	A3	19990625	<--	
	US 2001-754157	A2	20010104		
AB	The toner comprises a binder, a colorant, meadowfoam oil derivative, and an external additive. The toner may comprise (A) a core material of which surface is treated by heated air, containing at least a binder resin, a colorant or a magnetic material, meadowfoam oil derivative, and (B) additives or (C) a hydrophobic silica, a metal oxide fine particle and/or a metal acid salt. It prevents background fog, solid area image defects, and filming phenomena on a photoreceptor.				
IC	ICM G03G0009-08				
	ICS G03G0009-083; G03G0009-087; G03G0009-113; G03G0015-08				
CC	74-3 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)				
IT	115-77-5D, Pentaerythritol, monoesters with meadowfoam oil fatty acid 1309-48-4, Magnesium oxide, uses 1312-43-2, Indium oxide 1314-23-4, Zirconium oxide, uses 1332-29-2, Tin oxide 1344-28-1, Aluminum oxide, uses 7429-90-5D, Aluminum, salts with meadowfoam oil fatty acid, uses 7439-89-6D, Iron, salts with meadowfoam oil fatty acid, uses 7439-92-1D, Lead, salts with meadowfoam oil fatty acid, uses 7439-95-4D, Magnesium, salts with meadowfoam oil fatty acid, uses 7439-96-5D, Manganese, salts with meadowfoam oil fatty acid, uses 7440-02-0D, Nickel, salts with meadowfoam oil fatty acid, uses 7440-09-7D, Potassium, salts with meadowfoam oil fatty acid, uses 7440-23-5D, Sodium, salts with meadowfoam oil fatty acid, uses 7440-39-3D, Barium, salts with meadowfoam oil fatty acid, uses 7440-48-4D, Cobalt, salts with meadowfoam oil fatty acid, uses 7440-66-6D, Zinc, salts with meadowfoam oil fatty acid, uses 7440-70-2D, Calcium, salts with meadowfoam oil fatty acid, uses 7631-86-9, Silica, uses 12036-39-4, Strontium				

zirconate 12047-27-7, Barium titanate, uses 12063-10-4, Manganese ferrite 13463-67-7, Titania, uses 53027-29-5, Iron lithium manganese oxide

RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)

(electrophotog. toner containing meadowfoam oil derivative)

IT 7440-39-3D, Barium, salts with meadowfoam oil fatty acid, uses 7440-70-2D, Calcium, salts with meadowfoam oil fatty acid, uses 53027-29-5, Iron lithium manganese oxide

RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)

(electrophotog. toner containing meadowfoam oil derivative)

RN 7440-39-3 HCAPLUS

CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

RN 53027-29-5 HCAPLUS

CN Iron lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2
Fe	x	7439-89-6

L95 ANSWER 25 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:129700 HCAPLUS

DN 132:173354

TI Electrophotographic toner containing jojoba oil and electrophotographic apparatus

IN Yuasa, Yasuhito

PA Matsushita Electric Industrial Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 32 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 6

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000056500	A	20000225	JP 1998-223941	19980807 <--
	CN 1246659	A	20000308	CN 1999-111474	19990625 <--
	CN 1664708	A	20050907	CN 2005-10004341	19990625 <--
	US 2001000743	A1	20010503	US 2001-754161	20010104 <--
	US 6270937	B2	20010807		
	US 2001002305	A1	20010531	US 2001-754157	20010104 <--
	US 6326116	B2	20011204		
	US 2002086229	A1	20020704	US 2001-976884	20011012 <--

US 6432599 B2 20020813

PRAI JP 1998-178545 A 19980625 <--

JP 1998-223940 A 19980807 <--

JP 1998-223941 A 19980807 <--

JP 1998-223942 A 19980807 <--

JP 1998-233948 A 19980820 <--

US 1999-337843 B3 19990621 <--

CN 1999-111474 A3 19990625 <--

US 2001-754157 A2 20010104

AB The toner comprises a binder, a colorant, jojoba oil derivative, and an external additive. The toner may comprise (A) a core material of which surface is treated by heated air, containing at least a binder resin, a colorant or a magnetic material, jojoba oil derivative, and (B) additives or (C) a hydrophobic silica, a metal oxide fine particle and/or a metal acid salt. It prevents background fog, solid area image defects, and filming on a photoreceptor.

IC ICM G03G0009-08

ICS G03G0009-083; G03G0009-087; G03G0009-113; G03G0015-08

CC 74-3 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

IT 115-77-5D, Pentaerythritol, monoesters with jojoba oil fatty acid 1309-48-4, Magnesium oxide, uses 1312-43-2, Indium oxide 1314-23-4, Zirconium oxide, uses 1332-29-2, Tin oxide 1344-28-1, Aluminum oxide, uses 7429-90-5D, Aluminum, salts with jojoba oil fatty acid, uses 7439-89-6D, Iron, salts with jojoba oil fatty acid, uses 7439-92-1D, Lead, salts with jojoba oil fatty acid, uses 7439-95-4D, Magnesium, salts with jojoba oil fatty acid, uses 7439-96-5D, Manganese, salts with jojoba oil fatty acid, uses 7440-02-0D, Nickel, salts with jojoba oil fatty acid, uses 7440-09-7D, Potassium, salts with jojoba oil fatty acid, uses 7440-23-5D, Sodium, salts with jojoba oil fatty acid, uses 7440-39-3D, Barium, salts with jojoba oil fatty acid, uses 7440-48-4D, Cobalt, salts with jojoba oil fatty acid, uses 7440-66-6D, Zinc, salts with jojoba oil fatty acid, uses 7440-70-2D, Calcium, salts with jojoba oil fatty acid, uses 7631-86-9, Silica, uses 12036-39-4, Strontium zirconate 12047-27-7, Barium titanate, uses 12063-10-4, Manganese ferrite 13463-67-7, Titania, uses 53027-29-5, Iron lithium manganese oxide

RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)

(electrophotog. toner containing jojoba oil derivative)

IT 7440-39-3D, Barium, salts with jojoba oil fatty acid, uses 7440-70-2D, Calcium, salts with jojoba oil fatty acid, uses 53027-29-5, Iron lithium manganese oxide

RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)

(electrophotog. toner containing jojoba oil derivative)

RN 7440-39-3 HCAPLUS

CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

RN 53027-29-5 HCAPLUS  
 CN Iron lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2
Fe	x	7439-89-6

L95 ANSWER 26 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:115305 HCAPLUS

DN 132:125376

TI Secondary lithium **batteries**

IN Yoshida, Tomokazu; Kida, Yoshinori; Ohshita, Ryuji; Noma, Toshiyuki;  
 Nishio, Koji

PA Sanyo Electric Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000048820	A	20000218	JP 1998-227665	19980727 <--
	JP 3573971	B2	20041006		
PRAI	JP 1998-227665		19980727 <--		

AB The **batteries** use **cathodes** composed of Li transition metal (Co, Mn, Ni, and/or Fe) oxide particles coated with a metal conductive layer containing In, Mg, Al, Ba, Sr, Ca, Zn, Sn, Bi, Ce, and/or Yb. The **battery** electrolyte uses a (1-4):(1-4) cyclic carbonate ester-linear carbonate ester solvent mixture

IC ICM H01M0004-62

ICS H01M0004-02; H01M0004-04; H01M0004-58;  
 H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery cathode** lithium transition metal oxide metal coating; carbonate ester mixt **battery** electrolyte solvent

IT **Battery cathodes**

(**cathodes** from lithium transition metal oxide particles with metal coatings for **batteries**)

IT **Battery electrolytes**

(electrolyte solvent mixts. containing linear and cyclic carbonate esters for secondary lithium **batteries**)

IT **Secondary batteries**

(secondary lithium **batteries** with metal coated lithium transition metal oxide **cathode** particles and mixed carbonate ester electrolyte solvents)

IT 203005-82-7, Cobalt lithium manganese nickel oxide  
 (Co<sub>0.15</sub>LiMn<sub>0.05</sub>Ni<sub>0.80</sub>O<sub>2</sub>)

RL: DEV (Device component use); USES (Uses)

(**cathodes** from lithium transition metal oxide particles with metal coatings for **batteries**)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 110-71-4  
 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate

RL: DEV (Device component use); USES (Uses)

(electrolyte solvent mixts. containing linear and cyclic carbonate esters for secondary lithium **batteries**)

IT 7429-90-5, Aluminum, uses 7439-95-4, Magnesium, uses 7440-24-6, Strontium, uses 7440-31-5, Tin, uses **7440-39-3**, Barium, uses 7440-45-1, Cerium, uses 7440-64-4, Ytterbium, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses **7440-70-2**, Calcium, uses 7440-74-6, Indium, uses  
 RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (metal coatings on lithium transition metal oxide particles for **cathodes** in **batteries**)

IT **203005-82-7**, Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>LiMn<sub>0.05</sub>Ni<sub>0.80</sub>O<sub>2</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (**cathodes** from lithium transition metal oxide particles with metal coatings for **batteries**)

RN 203005-82-7 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.15</sub>LiMn<sub>0.05</sub>Ni<sub>0.80</sub>O<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.15	7440-48-4
Ni	0.8	7440-02-0
Mn	0.05	7439-96-5
Li	1	7439-93-2

IT **7440-39-3**, Barium, uses **7440-70-2**, Calcium, uses  
 RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (metal coatings on lithium transition metal oxide particles for **cathodes** in **batteries**)

RN 7440-39-3 HCAPLUS

CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS

CN Calcium (CA INDEX NAME)

Ca

L95 ANSWER 27 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2000:32599 HCAPLUS

DN 132:80907

TI Graphite particles, their manufacture, carbonaceous **anode** materials for lithium secondary **batteries**, the **battery anodes**, and the **batteries**

IN Ishii, Yoshito; Yokobori, Kenji; Hasumi, Takeshi; Nishida, Tatsuya; Takei, Koichi; Fujita, Atsushi

PA Hitachi Chemical Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

PATENT NO.

KIND

DATE

APPLICATION NO.

DATE



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 PI JP 2000012017 A 20000114 JP 1998-171222 19980618 <--  
 JP 3732654 B2 20060105  
 PRAI JP 1998-171222 19980618 <--  
 AB A mixture of graphitizable materials and  $\geq 2$  compds. containing different metals is fired for graphitization to give the claimed graphite particles. Graphite particles containing  $\geq 2$  different metals, carbonaceous **anodes** comprising the particles, secondary lithium **battery anodes** comprising the coatings of the particles and collectors, and secondary lithium **batteries** comprising the **anodes** and Li compound **cathodes** are also claimed. **Batteries** with excellent charge-discharge characteristics are obtained.  
 IC ICM H01M0004-58  
 ICS C01B0031-04; H01M0004-02; H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST metal contg graphite particle **battery anode**; secondary lithium **battery carbonaceous anode**  
 IT Pitch  
 (graphite particles from; manufacture of graphite particles containing different metals and their use as **anodes** in secondary lithium **batteries**)  
 IT Coal tar  
 Coke  
 RL: PEP (Physical, engineering or chemical process); PROC (Process)  
 (graphite particles from; manufacture of graphite particles containing different metals and their use as **anodes** in secondary lithium **batteries**)  
 IT **Secondary batteries**  
 (lithium; manufacture of graphite particles containing different metals and their use as **anodes** in secondary lithium **batteries**)  
 IT **Battery anodes**  
 Graphitization  
 (manufacture of graphite particles containing different metals and their use as **anodes** in secondary lithium **batteries**)  
 IT 12190-79-3, Cobalt lithium oxide (CoLiO<sub>2</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (**cathode**; manufacture of graphite particles containing different metals and their use as **anodes** in secondary lithium **batteries**)  
 IT 409-21-2, Silicon carbide, processes 1332-37-2, Iron oxide, processes 10043-35-3, Boric acid, processes  
 RL: PEP (Physical, engineering or chemical process); PROC (Process)  
 (graphite particles containing metals from; manufacture of graphite particles containing different metals and their use as **anodes** in secondary lithium **batteries**)  
 IT 7439-89-6, Iron, uses 7440-02-0, Nickel, uses 7440-21-3, Silicon, uses 7440-32-6, Titanium, uses 7440-42-8, Boron, uses  
 RL: DEV (Device component use); MOA (**Modifier or additive use**); USES (Uses)  
 (graphite particles containing; manufacture of graphite particles containing different metals and their use as **anodes** in secondary lithium **batteries**)  
 IT 7782-42-5P, Graphite, uses  
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (manufacture of graphite particles containing different metals and their use as

**anodes** in secondary lithium **batteries**)  
 IT 12190-79-3, Cobalt lithium oxide (CoLiO<sub>2</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (cathode; manufacture of graphite particles containing different  
 metals and their use as **anodes** in secondary lithium  
**batteries**)  
 RN 12190-79-3 HCAPLUS  
 CN Cobalt lithium oxide (CoLiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

IT 7440-21-3, Silicon, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use);  
 USES (Uses)  
 (graphite particles containing; manufacture of graphite particles containing  
 different metals and their use as **anodes** in secondary lithium  
**batteries**)  
 RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

L95 ANSWER 28 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 1999:412884 HCAPLUS  
 DN 131:76211  
 TI Secondary lithium **batteries** and products using the  
**batteries**  
 IN Kasai, Masahiro; Dozono, Toshinori  
 PA Hitachi, Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11176441	A	19990702	JP 1997-344663	19971215 <--
	JP 2004259700	A	20040916	JP 2004-94001	20040329 <--
PRAI	JP 1997-344663	A3	19971215	<--	

AB The **batteries** comprise **cathode** active materials  
 comprising spinel-structured Li<sub>1+x</sub>Mn<sub>2-x</sub>O<sub>4</sub> (0 < x < 1.33) and 0.01-10 mol%  
 additives other than Li, Mn, and O (preferably B, P, Mg, As, Sb, Zr, Na,  
 Be, Y, Si, Al, C, F, Bi, Pb, Ge, and/or Sn), that are optionally heat  
 treated at 400-900°. Active materials of (A) Li<sub>1+x</sub>MyMn<sub>2-x-y</sub>O<sub>4</sub> (0 <  
 x < 1.33; 0 < y < 2; M ≥ 1 transition metals other than Mn) and  
 0.01-10 mol% additives other than Li, Mn, and O, (B) Li<sub>1+x</sub>MyMn<sub>2-x-y-z</sub>BzO<sub>4</sub>  
 (0 < x < 1.33; 0 < y + z < 2; M ≥ 1 transition metals other than Mn;  
 B ≥ 1 elements other than Li, Mn, and M), or (C) (Li,  
 A)<sub>1+x</sub>MyMn<sub>2-x-y-z</sub>BzO<sub>4</sub> (0 < x < 1.33; 0 < y + z < 2; M ≥ 1 transition  
 metals other than Mn; A = Mg, Zn, Fe, Cu, and/or Ni; B ≥ 1 elements  
 other than Li, Mn, and M). Portable phones, portable videos camera,  
 personal computers, domestic elec. appliances, elec. power storage

systems, and elec. cars using the secondary lithium **batteries** as power sources are also claimed.

IC ICM **H01M0004-58**  
ICS **H01M0004-02; H01M0010-40**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery cathode** active material;  
lithium manganese oxide based **battery cathode**

IT Electric vehicles  
Electric vehicles  
(automobiles; lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT Telephones  
(cellular; lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT Electric appliances  
(domestic; lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT Automobiles  
Automobiles  
Energy storage systems  
(elec.; lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT **Battery cathodes**  
(lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT **Secondary batteries**  
(lithium; lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT Computers  
(microcomputers; lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT Video cameras  
(portable; lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT **132001-60-6**, Lithium manganese oxide (Li1-2.33Mn1.67-2O4)  
**229173-80-2**, Cobalt lithium magnesium manganese oxide  
(Co0.1Li1.1Mg0.15Mn1.65O4)  
RL: DEV (Device component use); USES (Uses)  
(lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses **7440-21-3**, Silicon, uses 7440-23-5, Sodium, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-38-2, Arsenic, uses 7440-41-7, Beryllium, uses 7440-42-8, Boron, uses 7440-44-0, Carbon, uses **7440-56-4**, Germanium, uses 7440-65-5, Yttrium, uses 7440-67-7, Zirconium, uses 7440-69-9, Bismuth, uses 7440-74-6, Indium, uses 7723-14-0, Phosphorus, uses 7782-41-4, Fluorine, uses  
RL: DEV (Device component use); **MOA (Modifier or additive use)**;  
USES (Uses)  
(lithium manganese oxide containing additives as secondary **battery cathode** active materials)

IT **132001-60-6**, Lithium manganese oxide (Li1-2.33Mn1.67-2O4)  
**229173-80-2**, Cobalt lithium magnesium manganese oxide  
(Co0.1Li1.1Mg0.15Mn1.65O4)  
RL: DEV (Device component use); USES (Uses)  
(lithium manganese oxide containing additives as secondary **battery cathode** active materials)

RN 132001-60-6 HCAPLUS

CN Lithium manganese oxide (Li1-2.33Mn1.67-2O4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	1.67 - 2	7439-96-5
Li	1 - 2.33	7439-93-2

RN 229173-80-2 HCAPLUS

CN Cobalt lithium magnesium manganese oxide (Co0.1Li1.1Mg0.15Mn1.65O4) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Co	0.1	7440-48-4
Mn	1.65	7439-96-5
Mg	0.15	7439-95-4
Li	1.1	7439-93-2

IT 7440-21-3, Silicon, uses 7440-56-4, Germanium, uses  
RL: DEV (Device component use); MOA (Modifier or additive use);  
USES (Uses)  
(lithium manganese oxide containing additives as secondary **battery**  
**cathode** active materials)

RN 7440-21-3 HCAPLUS

CN Silicon (CA INDEX NAME)

Si

RN 7440-56-4 HCAPLUS

CN Germanium (CA INDEX NAME)

Ge

L95 ANSWER 29 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1999:277604 HCAPLUS

DN 130:314444

TI Secondary nonaqueous **batteries** with lithium cobalt mixed oxide  
**cathodes**

IN Kawai, Kiyoshi; Miyasaka, Isao

PA Fuji Film Celltec K. K., Japan; Fuji Photo Film Co., Ltd.

SO Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11121004	A	19990430	JP 1997-283999	19971016 <--
PRAI	JP 1997-283999		19971016	<--	

AB The title **batteries** use **cathodes** containing LixNiyCol-yO2  
(x = 0.1-1.05; y = 0-0.2) and 120-5000 ppm (vs. **cathode** active  
mass) alkaline earth metals. The **batteries** have long cycle life and  
high discharge capacity.

IC ICM H01M0004-58  
 ICS H01M0004-02; H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST lithium nickel cobalt oxide **cathode battery**; alk earth  
 metal **cathode** lithium **battery**  
 IT **Battery cathodes**  
 (lithium cobalt mixed oxide **cathodes** containing alkaline earth metals  
 for **batteries**)  
 IT Alkaline earth metals  
 RL: DEV (Device component use); MOA (Modifier or additive use); USES  
 (Uses)  
 (lithium cobalt mixed oxide **cathodes** containing alkaline earth metals  
 for **batteries**)  
 IT **Secondary batteries**  
 (lithium; lithium cobalt mixed oxide **cathodes** containing alkaline  
 earth metals for **batteries**)  
 IT **113066-92-5**, Cobalt lithium nickel oxide (Co<sub>0.9</sub>LiNi<sub>0.1</sub>O<sub>2</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (lithium cobalt mixed oxide **cathodes** containing alkaline earth metals  
 for **batteries**)  
 IT 7439-95-4, Magnesium, uses 7440-24-6, Strontium, uses **7440-39-3**  
 , Barium, uses **7440-70-2**, Calcium, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use);  
 USES (Uses)  
 (lithium cobalt mixed oxide **cathodes** containing alkaline earth metals  
 for **batteries**)  
 IT **113066-92-5**, Cobalt lithium nickel oxide (Co<sub>0.9</sub>LiNi<sub>0.1</sub>O<sub>2</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (lithium cobalt mixed oxide **cathodes** containing alkaline earth metals  
 for **batteries**)  
 RN 113066-92-5 HCAPLUS  
 CN Cobalt lithium nickel oxide (Co<sub>0.9</sub>LiNi<sub>0.1</sub>O<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.9	7440-48-4
Ni	0.1	7440-02-0
Li	1	7439-93-2

IT **7440-39-3**, Barium, uses **7440-70-2**, Calcium, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use);  
 USES (Uses)  
 (lithium cobalt mixed oxide **cathodes** containing alkaline earth metals  
 for **batteries**)  
 RN 7440-39-3 HCAPLUS  
 CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

L95 ANSWER 30 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 1999:111963 HCAPLUS  
 DN 130:184881  
 TI Secondary nonaqueous-electrolyte lithium **battery**  
 IN Igawa, Akiko; Tsuruoka, Shigeo; Yoshikawa, Masanori; Muranaka, Yasushi  
 PA Hitachi, Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 10 pp.  
 CODEN: JKXXAF

DT **Patent**  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11040153	A	19990212	JP 1997-193612	19970718 <--
PRAI	JP 1997-193612		19970718	<--	

AB In the **battery**, an **anode** active mass comprises a C material containing an element which forms a compound with an alkali metal and an element which does not form a compound with an alkali metal, and a **cathode** active mass comprises AwPvNixMyNzO2 (A ≥ 1 alkali metal; P = Mg, B, P, and/or In; M = Mn, Co, and/or Al; N = Si, Al, Ca, Cu, Sn, Mo, Nb, Y, and/or Bi; w = 0.05-1.2; v = 0.0001-0.2; x = 0.5-0.95; y = 0.005-0.5; z = 0-0.2) and a mixture of graphite having Lc ≥ 150 Å and carbon black having sp. surface area ≥ 50 m<sup>2</sup>/g as elec. conductors. The elements in the C material may form intermetallic compds. or oxides. Decrease in overvoltage during discharge is prevented and the **battery** shows high-rate performance and has long service life.

IC ICM H01M0004-58

ICS H01M0004-02; H01M0004-62; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 57, 76

ST mixed oxide **cathode** lithium **battery**; nonaq electrolyte lithium **battery**; carbon material additive **anode** lithium **battery**; graphite elec conductor **cathode** lithium **battery**; black carbon elec conductor **cathode** **battery**

IT **Battery anodes**

**Battery cathodes**

Electric conductors

(Li **battery** having C material **anode** containing additive and mixed oxide **cathode** containing graphite/carbon black mixture)

IT Carbon black, uses

RL: DEV (Device component use); PRP (Properties); USES (Uses)

(elec. conductor; Li **battery** having C material **anode** containing additive and mixed oxide **cathode** containing graphite/carbon black mixture)

IT 177997-09-0, Cobalt lithium nickel phosphorus oxide 177997-12-5, Boron cobalt lithium nickel oxide 177997-14-7, Cobalt indium lithium nickel oxide 180997-14-2, Cobalt lithium magnesium nickel oxide 207803-50-7, Aluminum cobalt lithium magnesium nickel oxide 220589-93-5 220589-94-6 220589-95-7

220589-96-8 220589-97-9 220589-98-0 220589-99-1 220590-00-1  
 220590-01-2 220590-02-3 220590-03-4 220590-04-5 220590-05-6  
 220590-06-7 220590-07-8

RL: DEV (Device component use); USES (Uses)

(Li **battery** having C material **anode** containing additive and mixed oxide **cathode** containing graphite/carbon black mixture)

IT 1344-28-1, Alumina, uses 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-02-0, Nickel, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses

7440-31-5, Tin, uses 7440-42-8, Boron, uses 7440-48-4, Cobalt, uses  
 7440-50-8, Copper, uses **7440-55-3**, Gallium, uses 7440-74-6,  
 Indium, uses 7704-34-9, Sulfur, uses 7720-78-7, Iron sulfate (FeSO4)  
 7723-14-0, Phosphorus, uses 7782-49-2, Selenium, uses 10045-86-0, Iron  
 phosphate (FePO4) 12035-57-3, Nickel silicide 12059-14-2, Nickel  
 silicide (Ni2Si) 22831-39-6, Magnesium silicide (Mg2Si) 193475-79-5,  
 Silicon tin oxide (SiSnO2) 220179-35-1, Aluminum tin oxide (AlSnO2)  
 220179-36-2, Tin boride oxide (SnBO2)  
 RL: DEV (Device component use); **MOA (Modifier or additive use)**;  
 USES (Uses)

(Li **battery** having C material **anode** containing additive  
 and mixed oxide **cathode** containing graphite/carbon black mixture)  
 IT 7782-42-5, Graphite, uses  
 RL: DEV (Device component use); PRP (Properties); USES (Uses)  
 (elec. conductor; Li **battery** having C material **anode**  
 containing additive and mixed oxide **cathode** containing  
 graphite/carbon black mixture)  
 IT 177997-09-0, Cobalt lithium nickel phosphorus oxide  
 180997-14-2, Cobalt lithium magnesium nickel oxide  
 207803-50-7, Aluminum cobalt lithium magnesium nickel oxide  
 220589-93-5 220589-94-6 220589-95-7  
 RL: DEV (Device component use); USES (Uses)  
 (Li **battery** having C material **anode** containing additive  
 and mixed oxide **cathode** containing graphite/carbon black mixture)  
 RN 177997-09-0 HCAPLUS  
 CN Cobalt lithium nickel phosphorus oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
P	x	7723-14-0
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 180997-14-2 HCAPLUS  
 CN Cobalt lithium magnesium nickel oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mg	x	7439-95-4
Li	x	7439-93-2

RN 207803-50-7 HCAPLUS  
 CN Aluminum cobalt lithium magnesium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mg	x	7439-95-4
Li	x	7439-93-2
Al	x	7429-90-5

RN 220589-93-5 HCAPLUS

CN Aluminum cobalt lithium magnesium nickel phosphorus oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
P	x	7723-14-0
Co	x	7440-48-4
Ni	x	7440-02-0
Mg	x	7439-95-4
Li	x	7439-93-2
Al	x	7429-90-5

RN 220589-94-6 HCAPLUS

CN Cobalt lithium magnesium manganese nickel phosphorus oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
P	x	7723-14-0
Co	x	7440-48-4
Ni	x	7440-02-0
Mn	x	7439-96-5
Mg	x	7439-95-4
Li	x	7439-93-2

RN 220589-95-7 HCAPLUS

CN Aluminum cobalt lithium magnesium manganese nickel phosphorus oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
P	x	7723-14-0
Co	x	7440-48-4
Ni	x	7440-02-0
Mn	x	7439-96-5
Mg	x	7439-95-4
Li	x	7439-93-2
Al	x	7429-90-5

IT 7440-21-3, Silicon, uses 7440-55-3, Gallium, uses

RL: DEV (Device component use); MOA (Modifier or additive use);

USES (Uses)

(Li **battery** having C material **anode** containing additive and mixed oxide **cathode** containing graphite/carbon black mixture)

RN 7440-21-3 HCAPLUS

CN Silicon (CA INDEX NAME)

Si

RN 7440-55-3 HCAPLUS



CN Gallium (CA INDEX NAME)

Ga

L95 ANSWER 31 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1999:56858 HCAPLUS

DN 130:156101

TI Secondary lithium **batteries** inhibiting lithium dendrite generation and electronic apparatus using the **batteries**

IN Ikgawa, Akiko; Tsuruoka, Shigeo; Takeuchi, Seiji; Yoshikawa, Masanori; Muranaka, Kiyoshi

PA Hitachi, Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11016571	A	19990122	JP 1997-165588	19970623 <--
PRAI	JP 1997-165588		19970623	<--	

AB The **batteries** use mixed oxides  $\text{AwNvNixMyO}_2$  (A = alkali metal; N = Mg, P; M = Mn, Co, Al; w = 0.05-1.2; v = 0.0001-0.02; x = 0.6-0.95; y = 0.005-0.4) as **cathode** active mass and carbon materials as **anode** active mass, whereas the carbon materials contain elements capable of forming compds. with alkali metals and contain another elements which do not form compds. with the alkali metals. The reactive elements may be selected from Pb, Sn, Al, Si, In, Ga, Ag, B, and Mg, and the inert elements may be selected from Fe, Cu, Co, Ni, P, S, and Se. Elec. apparatus equipped with the **batteries** are claimed. The elec. apparatus involve note-sized or pocket-sized personal computers and word processors, elec. book players, pen-input personal computers, (portable) telephones and copying machines, pagers, electronic diaries, calculators, liquid crystal televisions, electronic tools, translators, transceivers, memory cards, back-up power sources, tape recorders, radios, headphone stereophonic recorders, portable printers, handy cleaners, portable CD, video cassette recorders, road map-navigation systems, refrigerators, air conditioners, televisions, water-heating appliances, electronic ovens, dish washers, laundry machines, drying machines, game machines, lighting fitting, toys, road conditioners, medical equipments, (elec.) automobiles, elec. power-storage systems,. The reactive elements react with alkali metals (i.e., Li) to prevent generation of alkali metal dendrite in overcharging, while the formed compds. discharge the alkali metals in overdischarging to prevent reduction of the electrolytes.

IC ICM H01M0004-58

ICS H01M0004-02; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **battery** carbon **anode** additive; alkali metalnickel oxide **battery cathode**; dendrite preventionlithium **battery anode**IT **Battery anodes****Battery cathodes**(secondary Li **batteries** using carbon **anodes** and alkali metal nickel oxide **cathodes**)

IT 1344-28-1, Alumina, uses 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-02-0, Nickel, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses

7440-31-5, Tin, uses 7440-42-8, Boron, uses 7440-48-4, Cobalt, uses  
 7440-50-8, Copper, uses **7440-55-3**, Gallium, uses 7440-74-6,  
 Indium, uses 7704-34-9, Sulfur, uses 7720-78-7, Iron sulfate (FeSO4)  
 7723-14-0, Phosphorus, uses 7782-49-2, Selenium, uses 10045-86-0, Iron  
 phosphate (FePO4) 12035-57-3, Nickel silicide (NiSi) 12054-11-4  
 12059-14-2, Nickel silicide (Ni2Si) 21651-19-4, Tin oxide (SnO)  
 22831-39-6, Magnesium silicide (Mg2Si) 220179-34-0, Tin oxide silicide  
 (SnO2Si) 220179-35-1, Aluminum tin oxide (AlSnO2) 220179-36-2, Tin  
 boride oxide (SnBO2)

RL: DEV (Device component use); **MOA (Modifier or additive use);**  
 USES (Uses)

(additive in carbon **anodes**; secondary Li **batteries**  
 using carbon **anodes** and alkali metal nickel oxide  
**cathodes**)

IT 7440-44-0, Carbon, uses

RL: DEV (Device component use); USES (Uses)

(**battery anodes**; secondary Li **batteries**  
 using carbon **anodes** and alkali metal nickel oxide  
**cathodes**)

IT 220179-37-3, Cobalt lithium magnesium nickel oxide  
 (Co0.3Li0.05-1.2Mg0.01Ni0.7O2) 220179-38-4, Cobalt lithium  
 nickel oxide phosphate (Co0.3Li0.05-1.2Ni0.7O1.96(PO4)0.01)  
 220179-39-5, Cobalt lithium magnesium nickel oxide  
 (Co0.2Li0.05-1.2Mg0.01Ni0.8O2) 220179-40-8, Cobalt lithium  
 magnesium nickel oxide (Co0.1Li0.05-1.2Mg0.01Ni0.9O2) 220179-41-9\*\*\*,  
 Cobalt lithium magnesium nickel oxide (Co0.1Li0.05-1.2Mg0.02Ni0.9O2)  
 \*\*\*220179-42-0, Cobalt lithium nickel oxide (Co0.1Li0.05-1.2Ni0.9O2)  
 220179-44-2 220179-45-3, Lithium magnesium manganese  
 nickel oxide (Li0.05-1.2Mg0.01Mn0.3Ni0.7O2) 220179-46-4, Lithium  
 manganese nickel oxide phosphate (Li0.05-1.2Mn0.3Ni0.7O1.96(PO4)0.01)  
 220179-47-5, Lithium magnesium manganese nickel oxide  
 (Li0.05-1.2Mg0.01Mn0.2Ni0.8O2) 220179-48-6 220179-49-7  
 , Lithium magnesium manganese nickel oxide (Li0.05-1.2Mg0.01Mn0.1Ni0.9O2)  
 220179-50-0, Lithium manganese nickel oxide (Li0.05-  
 1.2Mn0.1Ni0.9O2) 220179-51-1, Aluminum lithium magnesium nickel  
 oxide (Al0.3Li0.05-1.2Mg0.01Ni0.7O2) 220179-52-2, Aluminum  
 lithium nickel oxide phosphate (Al0.3Li0.05-1.2Ni0.7O1.96(PO4)0.01)  
 220179-53-3, Aluminum lithium magnesium nickel oxide  
 (Al0.2Li0.05-1.2Mg0.01Ni0.8O2) 220179-54-4 220179-55-5  
 , Aluminum lithium magnesium nickel oxide (Al0.1Li0.05-1.2Mg0.01Ni0.9O2)  
 220179-56-6, Aluminum lithium nickel oxide (Al0.1Li0.05-  
 1.2Ni0.9O2)

RL: DEV (Device component use); USES (Uses)

(**cathodes**; secondary Li **batteries** using carbon  
**anodes** and alkali metal nickel oxide **cathodes**)

IT 7440-21-3, Silicon, uses **7440-55-3**, Gallium, uses

RL: DEV (Device component use); **MOA (Modifier or additive use);**  
 USES (Uses)

(additive in carbon **anodes**; secondary Li **batteries**  
 using carbon **anodes** and alkali metal nickel oxide  
**cathodes**)

RN 7440-21-3 HCAPLUS

CN Silicon (CA INDEX NAME)

Si

RN 7440-55-3 HCAPLUS

CN Gallium (CA INDEX NAME)

Ga

IT 220179-37-3, Cobalt lithium magnesium nickel oxide  
 (Co0.3Li0.05-1.2Mg0.01Ni0.7O2) 220179-38-4, Cobalt lithium  
 nickel oxide phosphate (Co0.3Li0.05-1.2Ni0.7O1.96(PO4)0.01)  
 220179-39-5, Cobalt lithium magnesium nickel oxide  
 (Co0.2Li0.05-1.2Mg0.01Ni0.8O2) 220179-40-8, Cobalt lithium  
 magnesium nickel oxide (Co0.1Li0.05-1.2Mg0.01Ni0.9O2) 220179-41-9  
 , Cobalt lithium magnesium nickel oxide (Co0.1Li0.05-1.2Mg0.02Ni0.9O2)  
 220179-42-0, Cobalt lithium nickel oxide (Co0.1Li0.05-1.2Ni0.9O2)  
 220179-44-2 220179-45-3, Lithium magnesium manganese  
 nickel oxide (Li0.05-1.2Mg0.01Mn0.3Ni0.7O2) 220179-46-4, Lithium  
 manganese nickel oxide phosphate (Li0.05-1.2Mn0.3Ni0.7O1.96(PO4)0.01)  
 220179-47-5, Lithium magnesium manganese nickel oxide  
 (Li0.05-1.2Mg0.01Mn0.2Ni0.8O2) 220179-48-6 220179-49-7  
 , Lithium magnesium manganese nickel oxide (Li0.05-1.2Mg0.01Mn0.1Ni0.9O2)  
 220179-50-0, Lithium manganese nickel oxide (Li0.05-  
 1.2Mn0.1Ni0.9O2) 220179-51-1, Aluminum lithium magnesium nickel  
 oxide (Al0.3Li0.05-1.2Mg0.01Ni0.7O2) 220179-52-2, Aluminum  
 lithium nickel oxide phosphate (Al0.3Li0.05-1.2Ni0.7O1.96(PO4)0.01)  
 220179-53-3, Aluminum lithium magnesium nickel oxide  
 (Al0.2Li0.05-1.2Mg0.01Ni0.8O2) 220179-54-4 220179-55-5  
 , Aluminum lithium magnesium nickel oxide (Al0.1Li0.05-1.2Mg0.01Ni0.9O2)  
 220179-56-6, Aluminum lithium nickel oxide (Al0.1Li0.05-  
 1.2Ni0.9O2)  
 RL: DEV (Device component use); USES (Uses)  
 (cathodes; secondary Li batteries using carbon  
 anodes and alkali metal nickel oxide cathodes)

RN 220179-37-3 HCAPLUS  
 CN Cobalt lithium magnesium nickel oxide (Co0.3Li0.05-1.2Mg0.01Ni0.7O2) (9CI)  
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Ni	0.7	7440-02-0
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-38-4 HCAPLUS  
 CN Cobalt lithium nickel oxide phosphate (Co0.3Li0.05-1.2Ni0.7O1.96(PO4)0.01)  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Co	0.3	7440-48-4
Ni	0.7	7440-02-0
Li	0.05 - 1.2	7439-93-2

RN 220179-39-5 HCAPLUS  
 CN Cobalt lithium magnesium nickel oxide (Co0.2Li0.05-1.2Mg0.01Ni0.8O2) (9CI)  
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.2	7440-48-4
Ni	0.8	7440-02-0
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-40-8 HCAPLUS

CN Cobalt lithium magnesium nickel oxide (Co0.1Li0.05-1.2Mg0.01Ni0.9O2) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.9	7440-02-0
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-41-9 HCAPLUS

CN Cobalt lithium magnesium nickel oxide (Co0.1Li0.05-1.2Mg0.02Ni0.9O2) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.9	7440-02-0
Mg	0.02	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-42-0 HCAPLUS

CN Cobalt lithium nickel oxide (Co0.1Li0.05-1.2Ni0.9O2) (9CI) (CA INDEX  
NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.9	7440-02-0
Li	0.05 - 1.2	7439-93-2

RN 220179-44-2 HCAPLUS

CN Cobalt lithium magnesium nickel oxide phosphate (Co0.1Li0.05-1.2Mg0.01Ni0.9O1.96(PO4)0.01) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Co	0.1	7440-48-4
Ni	0.9	7440-02-0
Mg	0.01	7439-95-4

Li | 0.05 - 1.2 | 7439-93-2

RN 220179-45-3 HCAPLUS

CN Lithium magnesium manganese nickel oxide (Li0.05-1.2Mg0.01Mn0.3Ni0.7O2)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.7	7440-02-0
Mn	0.3	7439-96-5
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-46-4 HCAPLUS

CN Lithium magnesium nickel oxide phosphate (Li0.05-1.2Mn0.3Ni0.7O1.96(PO4)0.01) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Ni	0.7	7440-02-0
Mn	0.3	7439-96-5
Li	0.05 - 1.2	7439-93-2

RN 220179-47-5 HCAPLUS

CN Lithium magnesium manganese nickel oxide (Li0.05-1.2Mg0.01Mn0.2Ni0.8O2)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.8	7440-02-0
Mn	0.2	7439-96-5
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-48-6 HCAPLUS

CN Lithium magnesium manganese nickel oxide phosphate (Li0.05-1.2Mg0.01Mn0.2Ni0.8O1.96(PO4)0.01) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Ni	0.8	7440-02-0
Mn	0.2	7439-96-5
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-49-7 HCAPLUS

CN Lithium magnesium manganese nickel oxide (Li0.05-1.2Mg0.01Mn0.1Ni0.9O2)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component
-----------	-------	-----------

		Registry Number
O	2	17778-80-2
Ni	0.9	7440-02-0
Mn	0.1	7439-96-5
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2

RN 220179-50-0 HCAPLUS

CN Lithium manganese nickel oxide (Li0.05-1.2Mn0.1Ni0.9O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.9	7440-02-0
Mn	0.1	7439-96-5
Li	0.05 - 1.2	7439-93-2

RN 220179-51-1 HCAPLUS

CN Aluminum lithium magnesium nickel oxide (Al0.3Li0.05-1.2Mg0.01Ni0.7O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.7	7440-02-0
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2
Al	0.3	7429-90-5

RN 220179-52-2 HCAPLUS

CN Aluminum lithium nickel oxide phosphate (Al0.3Li0.05-1.2Ni0.7O1.96(PO4)0.01) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Ni	0.7	7440-02-0
Li	0.05 - 1.2	7439-93-2
Al	0.3	7429-90-5

RN 220179-53-3 HCAPLUS

CN Aluminum lithium magnesium nickel oxide (Al0.2Li0.05-1.2Mg0.01Ni0.8O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.8	7440-02-0
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2
Al	0.2	7429-90-5

RN 220179-54-4 HCAPLUS

CN Aluminum lithium magnesium nickel oxide phosphate (Al<sub>0.2</sub>Li<sub>0.05</sub>-1.2Mg<sub>0.01</sub>Ni<sub>0.80</sub>1.96(PO<sub>4</sub>)<sub>0.01</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Ni	0.8	7440-02-0
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2
Al	0.2	7429-90-5

RN 220179-55-5 HCAPLUS

CN Aluminum lithium magnesium nickel oxide (Al<sub>0.1</sub>Li<sub>0.05</sub>-1.2Mg<sub>0.01</sub>Ni<sub>0.90</sub>2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.9	7440-02-0
Mg	0.01	7439-95-4
Li	0.05 - 1.2	7439-93-2
Al	0.1	7429-90-5

RN 220179-56-6 HCAPLUS

CN Aluminum lithium nickel oxide (Al<sub>0.1</sub>Li<sub>0.05</sub>-1.2Ni<sub>0.90</sub>2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.9	7440-02-0
Li	0.05 - 1.2	7439-93-2
Al	0.1	7429-90-5

L95 ANSWER 32 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1997:776528 HCAPLUS

DN 128:50670

TI Synthesis and properties of gallium-doped LiNiO<sub>2</sub> as the **cathode** material for lithium secondary **batteries**

AU Nishida, Yasunori; Nakane, Kenji; Satoh, Tomoari

CS Tsukuba, 6 Kitahara, Tsukuba Research Laboratory, Sumitomo Chemical Co., Ltd., Ibaraki 300-32, Japan

SO Journal of Power Sources (1997), 68(2), 561-564

CODEN: JPSODZ; ISSN: 0378-7753

PB Elsevier Science S.A.

DT Journal

LA English

AB Gallium doping of LiNiO<sub>2</sub> was investigated; the doping improved the cycling behavior of LiNiO<sub>2</sub>. The obtained material is single phase with hexagonal structure without any other compound, e.g., LiGaO<sub>2</sub>, being formed as determined

by

x-ray diffraction measurements. The crystal structure during charging process is stabilized by gallium doping. Hexagonal structure is retained in the charged state without monoclinic phase and without two hexagonal phase regions which are observed in undoped LiNiO<sub>2</sub>. Consequently, the

crystal lattice parameters change continuously and gradually. The gallium-doped LiNiO<sub>2</sub> shows superior rechargeable capacity of 190 mA-h/g and retention of >95% after 100 cycles in the cycling test between 3.0 and 4.3 V at room temperature. In the cycling test with higher charging voltage

(4.4

or 4.5 V), the rechargeable capacity reaches >200 mA-h/g without significant degradation of cycling behavior. Excellent overcharge resistance was also demonstrated.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST gallium doped lithium nickel oxide **cathode; battery**

doped lithium nickel oxide **cathode**

IT **Battery cathodes**

(synthesis and properties of gallium-doped lithium nickel oxide **cathode** material for lithium secondary **batteries**)

IT **12031-65-1P**, Lithium nickel oxide (LiNiO<sub>2</sub>)

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)

(gallium-doped; synthesis and properties of gallium-doped lithium nickel oxide **cathode** material for lithium secondary **batteries**)

IT **7440-55-3**, Gallium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(lithium nickel oxide doped with; synthesis and properties of gallium-doped lithium nickel oxide **cathode** material for lithium secondary **batteries**)

IT **12031-65-1P**, Lithium nickel oxide (LiNiO<sub>2</sub>)

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)

(gallium-doped; synthesis and properties of gallium-doped lithium nickel oxide **cathode** material for lithium secondary **batteries**)

RN 12031-65-1 HCAPLUS

CN Lithium nickel oxide (LiNiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

IT **7440-55-3**, Gallium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)

(lithium nickel oxide doped with; synthesis and properties of gallium-doped lithium nickel oxide **cathode** material for lithium secondary **batteries**)

RN 7440-55-3 HCAPLUS

CN Gallium (CA INDEX NAME)

Ga

# RETABLE

Referenced Author (RAU)	Year (RPY)	VOL (RVL)	PG (RPG)	Referenced Work (RWK)	Referenced File
=====	=====	=====	=====	=====	=====
Ebner, W	1994	69	1238	Solid State Ionics	HCAPLUS



Li, W	1993  67	123	Solid State Ionics	HCAPLUS
Ohzuku, T	1993  140	1862	J Electrochem Soc	HCAPLUS
Yamada, S	1994	423	Ext Abstr, 7th Int M	

L95 ANSWER 33 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1997:506888 HCAPLUS

DN 127:192923

TI Development of **cathode** material for lithium secondary

**batteries** and high performance lithium secondary **batteries**

AU Nakane, Kenji; Nishida, Yasunori; Nishikata, Genjiro; Yamamoto, Taketsugu;  
Kami, Ken-ichiro; Tateno, Tatsuo; Miura, Hitoshi; Satoh, Tomoari

CS Tsukuba Research Laboratory, Japan

SO Sumitomo Kagaku (Osaka) (1997), (1), 41-47

CODEN: SKAADZ; ISSN: 0387-1312

PB Sumitomo Kagaku Kogyo K.K.

DT Journal

LA Japanese

AB Lithium secondary **batteries** are very attractive for various applications because of high energy d. In com. available lithium secondary **batteries**, LiCoO<sub>2</sub> is used as an active material for a **cathode**. LiNiO<sub>2</sub>, which is also suitable for such **batteries**, has advantages of low cost and high capacity compared with LiCoO<sub>2</sub>. However, LiNiO<sub>2</sub> demonstrates poor cycle characteristics when it is used at high capacity. We found that the addition of gallium to LiNiO<sub>2</sub> improves the cycling behavior significantly. The gallium-stabilized LiNiO<sub>2</sub> shows superior rechargeable capacity of 190 mAh/g and retention of more than 95% after 100 cycles in the cycling test between 3.0 and 4.3 V at room temperature. We describe the production method and properties of this

newly

developed **cathode** active material, as well as the performance of 18650 cylindrical type test cells. In contrast with the com. available cells whose capacities are not more than 1350 mAh, our test cells achieved 1600 mAh with excellent cycle characteristics.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **battery cathode** development

IT **Battery cathodes**

(development of **cathode** material for lithium secondary **batteries** and high performance lithium secondary **batteries**)

IT **Secondary batteries**

(lithium; development of **cathode** material for lithium secondary **batteries** and high performance lithium secondary **batteries**)

IT 7440-55-3, Gallium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(LiNiO<sub>2</sub> stabilized by; development of **cathode** material for lithium secondary **batteries** and high performance lithium secondary **batteries**)

IT 12031-65-1, Lithium nickel oxide LiNiO<sub>2</sub> 12190-79-3,

Cobalt lithium oxide CoLiO<sub>2</sub>

RL: DEV (Device component use); USES (Uses)

(development of **cathode** material for lithium secondary **batteries** and high performance lithium secondary **batteries**)

IT 39300-70-4, Lithium nickel oxide

RL: DEV (Device component use); USES (Uses)

(gallium-stabilized; development of **cathode** material for lithium secondary **batteries** and high performance lithium secondary **batteries**)

IT 7440-55-3, Gallium, uses

RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (LiNiO<sub>2</sub> stabilized by; development of **cathode** material for  
 lithium secondary **batteries** and high performance lithium  
 secondary **batteries**)

RN 7440-55-3 HCAPLUS  
 CN Gallium (CA INDEX NAME)

Ga

IT **12031-65-1**, Lithium nickel oxide LiNiO<sub>2</sub> **12190-79-3**,  
 Cobalt lithium oxide CoLiO<sub>2</sub>  
 RL: DEV (Device component use); USES (Uses)  
 (development of **cathode** material for lithium secondary  
**batteries** and high performance lithium secondary  
**batteries**)

RN 12031-65-1 HCAPLUS  
 CN Lithium nickel oxide (LiNiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 12190-79-3 HCAPLUS  
 CN Cobalt lithium oxide (CoLiO<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	1	7440-48-4
Li	1	7439-93-2

IT **39300-70-4**, Lithium nickel oxide  
 RL: DEV (Device component use); USES (Uses)  
 (gallium-stabilized; development of **cathode** material for  
 lithium secondary **batteries** and high performance lithium  
 secondary **batteries**)

RN 39300-70-4 HCAPLUS  
 CN Lithium nickel oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

L95 ANSWER 34 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 1997:442716 HCAPLUS  
 DN 127:53474  
 TI Secondary lithium **batteries** with metal coated **cathodes**  
 IN Nishida, Nobumichi; Shoji, Yoshihiro; Yamamoto, Yuji; Nishio, Koji; Saito,  
 Toshihiko  
 PA Sanyo Electric Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 09147836	A	19970606	JP 1995-328251	19951122 <--
PRAI	JP 1995-328251		19951122 <--		

AB The **batteries** use **cathodes** coated with metals selected from Pt, Pd, Rh, Ir, Ru, Ti, W, Sn, Mo, Re, Os, Au, Cd, Tl, Ge, Pb, Bi, Cu, Ag, Hg, In, and Sb. The metals catalytically oxidizes reaction products of electrolyte solns. to prevent them from depositing on the **cathodes**.

IC ICM H01M0004-02

ICS H01M0004-62; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **battery cathode** metal coatingIT **Battery cathodes**(cobalt lithium nickel oxide **cathodes** with metal coatings for lithium **batteries**)

IT Oxidation catalysts

(cobalt lithium nickel oxide **cathodes** with oxidation catalyst coatings for preventing reaction product deposition in lithium **batteries**)IT 101920-93-8, Cobalt lithium nickel oxide (Co<sub>0.5</sub>LiNi<sub>0.5</sub>O<sub>2</sub>)

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(cobalt lithium nickel oxide **cathodes** with metal coatings for lithium **batteries**)

IT 7439-88-5, Iridium, uses 7439-92-1, Lead, uses 7439-97-6, Mercury, uses 7439-98-7, Molybdenum, uses 7440-04-2, Osmium, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-15-5, Rhenium, uses 7440-16-6, Rhodium, uses 7440-22-4, Silver, uses 7440-28-0, Thallium, uses 7440-31-5, Tin, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses 7440-36-0, Antimony, uses 7440-43-9, Cadmium, uses 7440-50-8, Copper, uses 7440-56-4, Germanium, uses 7440-57-5, Gold, uses 7440-69-9, Bismuth, uses 7440-74-6, Indium, uses 7440-75-7, RL: MOA (Modifier or additive use); USES (Uses)

(cobalt lithium nickel oxide **cathodes** with metal coatings for lithium **batteries**)IT 101920-93-8, Cobalt lithium nickel oxide (Co<sub>0.5</sub>LiNi<sub>0.5</sub>O<sub>2</sub>)

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)

(cobalt lithium nickel oxide **cathodes** with metal coatings for lithium **batteries**)

RN 101920-93-8 HCAPLUS

CN Cobalt lithium nickel oxide (Co<sub>0.5</sub>LiNi<sub>0.5</sub>O<sub>2</sub>) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.5	7440-48-4
Ni	0.5	7440-02-0
Li	1	7439-93-2

IT 7440-56-4, Germanium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(cobalt lithium nickel oxide **cathodes** with metal coatings for

lithium **batteries**)  
 RN 7440-56-4 HCAPLUS  
 CN Germanium (CA INDEX NAME)

Ge

L95 ANSWER 35 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 1997:14570 HCAPLUS  
 DN 126:62650  
 TI Secondary nonaqueous-electrolyte lithium **battery** and  
 oxygen-deficient lithium-manganese oxide spinel for its **cathode**  
 active material  
 IN Kemmler-Sack, Sibylle; Endres, Peter; Praas, Hans-Walter  
 PA Varta Batterie Ag, Germany  
 SO Ger. Offen., 12 pp.  
 CODEN: GWXXBX  
 DT **Patent**  
 LA German  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 19515630	A1	19961031	DE 1995-19515630	19950428 <--
	CA 2218315	A1	19961031	CA 1996-2218315	19960416 <--
	WO 9634423	A1	19961031	WO 1996-EP1592	19960416 <--
	W: BR, CA, CN, CZ, JP, KR, MX, RU, SG, US				
	RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	EP 827636	A1	19980311	EP 1996-914924	19960416 <--
	EP 827636	B1	19981223		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, NL, SE, PT, IE, FI				
	CN 1183171	A	19980527	CN 1996-193578	19960416 <--
	CN 1111920	B	20030618		
	BR 9608001	A	19990105	BR 1996-8001	19960416 <--
	AT 175056	T	19990115	AT 1996-914924	19960416 <--
	JP 11504154	T	19990406	JP 1996-532137	19960416 <--
	CZ 287338	B6	20001011	CZ 1997-3403	19960416 <--
	US 6183910	B1	20010206	US 1997-957111	19971024 <--
	HK 1016750	A1	20040319	HK 1998-111695	19981102 <--
PRAI	DE 1995-19515630	A	19950428	<--	
	WO 1996-EP1592	W	19960416	<--	

AB The spinel is  $\text{Li}_{1+x}\text{Mn}_2\text{-xO}_4$  where  $x \leq 0.33$  and  $0.01 \leq x \leq 0.5$  with exception for all  $x = 0.58 + 0.01$ .  
 A portion of Li can be replaced by an addnl. 1-valent or multivalent cation selected from Co, Mg, Zn, Ni, Ca, Bi, Ti, V, Rh, and Cu. The spinel is formed by heating a mixture of  $\text{LiOH.H}_2\text{O}$  or  $\text{Li}_2\text{CO}_3$  and a Mn oxide at  $350\text{-}900^\circ$ , subsequent heating at  $500\text{-}850^\circ$ , and cooling. The reaction product can be treated at  $600\text{-}850^\circ$  in an Ar-H atmospheric and cooled to  $\text{apprx.}20^\circ$  in Ar-H atmospheric, and then heated at  $500\text{-}850^\circ$  and cooled in Ar-O atmospheric. The spinel composition is also defined in a phase diagram with  $\text{MnO}$ ,  $\text{MnO}_2$ , and  $\text{Li}_2\text{MnO}_3$  end points.

IC ICM **H01M0004-50**  
 ICS **H01M0004-38; H01M0004-26**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 49

ST lithium manganese oxide spinel **battery cathode**; oxygen deficient lithium manganese oxide spinel

IT **Battery cathodes**  
 (oxygen-deficient lithium-manganese oxide spinel for)

IT 7439-95-4, Magnesium, uses 7440-02-0, Nickel, uses 7440-16-6, Rhodium, uses 7440-32-6, Titanium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses 7440-70-2, Calcium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (oxygen-deficient lithium-manganese oxide spinel for **cathode** active material containing)  
 IT 184905-11-1P, Lithium manganese oxide (Li<sub>1.04</sub>Mn<sub>1.96</sub>O<sub>3.94</sub>)  
 184905-12-2P, Lithium manganese oxide (Li<sub>1.1</sub>Mn<sub>1.90</sub>O<sub>3.9</sub>)  
 RL: PEP (Physical, engineering or chemical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)  
 (secondary nonaq.-electrolyte lithium **battery** its **cathode** active material of)  
 IT 7440-70-2, Calcium, uses  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (oxygen-deficient lithium-manganese oxide spinel for **cathode** active material containing)  
 RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

IT 184905-11-1P, Lithium manganese oxide (Li<sub>1.04</sub>Mn<sub>1.96</sub>O<sub>3.94</sub>)  
 184905-12-2P, Lithium manganese oxide (Li<sub>1.1</sub>Mn<sub>1.90</sub>O<sub>3.9</sub>)  
 RL: PEP (Physical, engineering or chemical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)  
 (secondary nonaq.-electrolyte lithium **battery** its **cathode** active material of)  
 RN 184905-11-1 HCAPLUS  
 CN Lithium manganese oxide (Li<sub>1.04</sub>Mn<sub>1.96</sub>O<sub>3.94</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	3.94	17778-80-2
Mn	1.96	7439-96-5
Li	1.04	7439-93-2

RN 184905-12-2 HCAPLUS  
 CN Lithium manganese oxide (Li<sub>1.1</sub>Mn<sub>1.90</sub>O<sub>3.9</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	3.9	17778-80-2
Mn	1.9	7439-96-5
Li	1.1	7439-93-2

L95 ANSWER 36 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 1996:620838 HCAPLUS  
 DN 125:253049  
 TI High voltage high safety secondary nonaqueous **batteries**  
 IN Idota, Yoshio  
 PA Fuji Photo Film Co Ltd, Japan  
 SO Jpn. Kokai Tokkyo Koho, 12 pp.  
 CODEN: JKXXAF  
 DT **Patent**

LA Japanese

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 08190909	A	19960723	JP 1995-3297	19950112 <--
	US 5686203	A	19971111	US 1995-562223	19951128 <--
PRAI	JP 1994-298456	A	19941201	<--	
	JP 1995-3297	A	19950112	<--	
AB	The <b>batteries</b> use <b>cathode</b> active mixts. containing additives selected from transition metals, Group IIIA elements, Group IVA (except C) elements, and their carbides. Preferably the transition metal and element have ion radius 0.1-1.0Å, and the additive is B, Si, B4C, or Mo2C. The <b>cathode</b> active mass is $\text{Li}_x\text{MO}_2$ ( $0.05 \leq x \leq 1.2$ ; M = Co, Ni, Mn, and/or Fe) and/or a spinel type compound contg Co, Ni, Mn, Fe, and/or V.				
IC	ICM <b>H01M0004-58</b> ICS <b>H01M0004-02</b> ; <b>H01M0010-40</b>				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)				
ST	<b>battery cathode</b> transition metal additive; carbide additive lithium metal oxide <b>cathode</b> ; safety <b>battery</b>				
IT	Group IIIA elements Group IVA elements Transition metal carbides Transition metals, uses RL: MOA (Modifier or additive use); USES (Uses) (additives for lithium metal multi oxide <b>cathodes</b> in secondary lithium <b>batteries batteries</b> )				
IT	Safety (high voltage high safety secondary lithium <b>batteries</b> )				
IT	<b>Cathodes</b> ( <b>battery</b> , additives for lithium metal multi oxide <b>cathodes</b> in secondary lithium <b>batteries batteries</b> )				
IT	Group IIIA element compounds Group IVA element compounds RL: MOA (Modifier or additive use); USES (Uses) (carbides, additives for lithium metal multi oxide <b>cathodes</b> in secondary lithium <b>batteries batteries</b> )				
IT	<b>12031-65-1</b> , Lithium nickel oxide ( $\text{LiNiO}_2$ ) <b>12057-17-9</b> , Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ ) <b>116327-69-6</b> , Cobalt lithium nickel oxide ( $\text{Co}_{0.1}\text{LiNi}_{0.9}\text{O}_2$ ) RL: DEV (Device component use); USES (Uses) (additives for lithium metal multi oxide <b>cathodes</b> in secondary lithium <b>batteries batteries</b> )				
IT	<b>7440-21-3</b> , Silicon, uses <b>7440-22-4</b> , Silver, uses <b>7440-42-8</b> , Boron, uses <b>7440-66-6</b> , Zinc, uses <b>12069-32-8</b> , Tetraboron carbide <b>12069-89-5</b> , Dimolybdenum carbide <b>12070-08-5</b> , Titanium carbide <b>12070-13-2</b> , Tungsten carbide RL: MOA (Modifier or additive use); USES (Uses) (additives for lithium metal multi oxide <b>cathodes</b> in secondary lithium <b>batteries batteries</b> )				
IT	<b>12031-65-1</b> , Lithium nickel oxide ( $\text{LiNiO}_2$ ) <b>12057-17-9</b> , Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ ) <b>116327-69-6</b> , Cobalt lithium nickel oxide ( $\text{Co}_{0.1}\text{LiNi}_{0.9}\text{O}_2$ ) RL: DEV (Device component use); USES (Uses) (additives for lithium metal multi oxide <b>cathodes</b> in secondary lithium <b>batteries batteries</b> )				
RN	<b>12031-65-1</b> HCAPLUS				
CN	Lithium nickel oxide ( $\text{LiNiO}_2$ ) (CA INDEX NAME)				

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 12057-17-9 HCAPLUS

CN Lithium manganese oxide (LiMn2O4) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Mn	2	7439-96-5
Li	1	7439-93-2

RN 116327-69-6 HCAPLUS

CN Cobalt lithium nickel oxide (Co0.1LiNi0.9O2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.9	7440-02-0
Li	1	7439-93-2

IT 7440-21-3, Silicon, uses

RL: MOA (Modifier or additive use); USES (Uses)

(additives for lithium metal multi oxide **cathodes** in  
secondary lithium **batteries batteries**)

RN 7440-21-3 HCAPLUS

CN Silicon (CA INDEX NAME)

Si

L95 ANSWER 37 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1996:472923 HCAPLUS

DN 125:119497

TI Secondary nonaqueous-electrolyte lithium **batteries** with improved  
**cathodes**

IN Fujiwara, Masafumi; Yamada, Shuji; Oosaki, Takahisa

PA Tokyo Shibaura Electric Co, Japan

SO Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 08138670	A	19960531	JP 1994-277513	19941111 <--
	JP 3195175	B2	20010806		
PRAI	JP 1994-277513		19941111	<--	

AB The **batteries** use **cathodes** from LiNiO2 containing alkali  
metals other than Li, alkaline earth metals, transition metals other than Ni,  
group III, IV, V, and/or chalcogens at least on the surface, and having

coatings containing higher amts. of the metals than the bulk, and preferably sp. surface area 0.5-2 m<sup>2</sup>/g. The metals may have a specified Pauling electronegativity.

IC ICM H01M0004-58  
ICS H01M0004-02; H01M0010-40  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST lithium nickel oxide **cathode battery**; metal coating  
**cathode battery**  
IT Alkali metals, uses  
Alkaline earth metals  
Group IIIB elements  
Group IVB elements  
Group VB elements  
Group VIA elements  
RL: MOA (Modifier or additive use); USES (Uses)  
(**cathodes** from lithium nickel oxide having high-metal surface layer)  
IT **Cathodes**  
(**battery**, from lithium nickel oxide having high-metal surface layer)  
IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-96-5, Manganese, uses 7440-21-3, Silicon, uses 7440-42-8, Boron, uses 7440-48-4, Cobalt, uses 7440-55-3, Gallium, uses 7440-66-6, Zinc, uses 7704-34-9, Sulfur, uses 7723-14-0, Phosphorus, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(**cathodes** from lithium nickel oxide having high-metal surface layer)  
IT 12031-65-1, Lithium nickel oxide (LiNiO<sub>2</sub>)  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(**cathodes** having high-metal surface layer)  
IT 1309-33-7, Iron hydroxide [Fe(OH)<sub>3</sub>] 1310-65-2, Lithium hydroxide 10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate 10377-66-9, Manganese nitrate 12007-60-2, Lithium borate (Li<sub>2</sub>B<sub>4</sub>O<sub>7</sub>) 13494-91-2, Gallium sulfate [Ga<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>] 20427-58-1, Zinc hydroxide 21041-93-0, Cobalt hydroxide [Co(OH)<sub>2</sub>] 21645-51-2, Aluminum hydroxide, processes 82867-86-5  
RL: PEP (Physical, engineering or chemical process); PROC (Process)  
(in prepn of **cathodes** from lithium nickel oxide having high-metal surface layer)  
IT 7440-21-3, Silicon, uses 7440-55-3, Gallium, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(**cathodes** from lithium nickel oxide having high-metal surface layer)  
RN 7440-21-3 HCAPLUS  
CN Silicon (CA INDEX NAME)

Si

RN 7440-55-3 HCAPLUS  
CN Gallium (CA INDEX NAME)

Ga

IT 12031-65-1, Lithium nickel oxide (LiNiO<sub>2</sub>)  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(**cathodes** having high-metal surface layer)



RN 12031-65-1 HCAPLUS  
 CN Lithium nickel oxide (LiNiO2) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

L95 ANSWER 38 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 1995:305216 HCAPLUS

DN 122:85415

TI Composite solid electrolyte and alkali metal **batteries** using this electrolyte

IN Peled, Emanuel; Golodnitsky, Diana; Cohen, Ronen; Menachem, Chen  
 PA Shoshan, Herbert Z., Israel; Ramot University Authority for Applied Research and Industrial Development Ltd.

SO PCT Int. Appl., 39 pp.

CODEN: PIXXD2

DT **Patent**

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9424715	A1	19941027	WO 1994-US3800	19940407 <--
	W: AU, BB, BG, BR, BY, CA, CN, CZ, FI, GE, HU, JP, KG, KP, KR, KZ, LK, LV, MD, MG, MN, MW, NO, NZ, PL, RO, RU, SD, SI, SK, TJ, TT, UA, UZ, VN				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG				
	IL 105341	A	19961205	IL 1993-105341	19930408 <--
	AU 9466276	A	19941108	AU 1994-66276	19940407 <--
	US 5472808	A	19951205	US 1994-224470	19940407 <--
	EP 693226	A1	19960124	EP 1994-914064	19940407 <--
	R: DE, ES, FR, GB, IT, NL, SE				
	BR 9406754	A	19960227	BR 1994-6754	19940407 <--
	JP 08508850	T	19960917	JP 1994-523297	19940407 <--
PRAI	IL 1993-105341	A	19930408	<--	
	WO 1994-US3800	W	19940407	<--	

AB The electrolyte comprises micron-size nonconductive oxide particles, an alkali metal salt, an electronically insulating elastomer, and an aprotic solvent. The electrolyte is used in primary and secondary **batteries**.

IC ICM H01M0006-18

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

ST alkali metal **battery** composite electrolyte

IT **Battery electrolytes**

(containing aprotic solvent and metal-PEO complexes and oxide particles)

IT 1304-28-5, Barium oxide, uses 1305-78-8, Calcium oxide, uses  
 1309-48-4, Magnesium oxide, uses 1314-11-0, Strontium oxide, uses  
 1344-28-1, Alumina, uses 7631-86-9, Silica, uses

RL: DEV (Device component use); USES (Uses)

(**battery** composite electrolyte containing aprotic solvent and metal-PEO complexes and)

IT 67-68-5, DMSO, uses 96-47-9, 2-Methyltetrahydrofuran 96-48-0,  
 γ-Butyrolactone 96-49-1, Ethylene carbonate 105-58-8, Carbonic  
 acid, diethyl ester 108-32-7, Propylene carbonate 109-99-9, THF, uses

110-71-4, DME 646-06-0, Dioxolane  
 RL: DEV (Device component use); USES (Uses)  
 (**battery** composite electrolyte containing metal-PEO complexes and  
 oxide particles and)  
 IT 7439-93-2D, Lithium, PEO complexes 7440-09-7D, Potassium, PEO complexes  
 7440-23-5D, Sodium, PEO complexes 25322-68-3D, PEO, metal complexes  
 RL: DEV (Device component use); USES (Uses)  
 (**battery** composite electrolyte containing oxide particles and  
 aprotic solvent and)  
 IT 7429-90-5D, Aluminum, PEO complexes 7439-95-4D, Magnesium, PEO complexes  
 7440-24-6D, Strontium, PEO complexes **7440-39-3D**, Barium, PEO  
 complexes **7440-70-2D**, Calcium, PEO complexes  
 RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (**battery** composite electrolyte containing oxide particles and  
 aprotic solvent and)  
 IT 1314-62-1, Vanadium oxide (V2O5), uses 1317-37-9, Iron sulfide (FeS)  
 12039-13-3, Titanium disulfide 12068-85-8, Iron disulfide  
**123550-86-7**, Lithium manganese oxide (Li0.5-1MnO2) 160353-28-6,  
 Vanadium oxide (V3O16) 160375-04-2, Cobalt sulfide (CoS0.8-4.5)  
 160375-05-3, Nickel sulfide (NiS0.8-4.5)  
 RL: DEV (Device component use); USES (Uses)  
 (**cathodes** in **batteries** with composite electrolyte)  
 IT **7440-39-3D**, Barium, PEO complexes **7440-70-2D**, Calcium,  
 PEO complexes  
 RL: **MOA (Modifier or additive use)**; USES (Uses)  
 (**battery** composite electrolyte containing oxide particles and  
 aprotic solvent and)  
 RN 7440-39-3 HCAPLUS  
 CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

IT **123550-86-7**, Lithium manganese oxide (Li0.5-1MnO2)  
 RL: DEV (Device component use); USES (Uses)  
 (**cathodes** in **batteries** with composite electrolyte)  
 RN 123550-86-7 HCAPLUS  
 CN Lithium manganese oxide (Li0.5-1MnO2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Mn	1	7439-96-5
Li	0.5 - 1	7439-93-2

L95 ANSWER 39 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 1995:249108 HCAPLUS  
 DN 122:13796  
 TI Secondary lithium **batteries** with improved **cathodes**  
 IN Yamada, Shuji; Fujiwara, Masafumi; Oosaki, Takahisa

PA Tokyo Shibaura Electric Co, Japan  
 SO Jpn. Kokai Tokkyo Koho, 9 pp.  
 CODEN: JKXXAF

DT **Patent**

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06267538	A	19940922	JP 1993-48893	19930310 <--
PRAI	JP 1993-48893		19930310 <--		

AB The **batteries** use  $\text{Li}_x\text{NiO}_2$  ( $0 < x < 1.1$ ) as **cathode** active mass, where the Ni may be partially substituted by other transition metals, containing B, B compds., Si, and/or Si compds. These **batteries** have long cycle life.

IC ICM **H01M0004-58**

ICS **H01M0004-02; H01M0010-40**

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium nickel boron oxide **cathode**; silicon lithium nickel oxide **cathode**; **battery** lithium nickel oxide **cathode**

IT **Cathodes**

(**battery**, lithium nickel oxide **cathodes** containing boron and silicon and their compds. for cycle life)

IT **12031-65-1**, Lithium nickel oxide ( $\text{LiNiO}_2$ ) **136073-31-9**, Lithium nickel oxide ( $\text{LiO}-1.1\text{NiO}_2$ )

RL: DEV (Device component use); USES (Uses)

(secondary lithium **batteries** with improved **cathodes**)

IT **7440-21-3**, Silicon, uses **7440-42-8**, Boron, uses **10043-35-3**, Boric acid, uses **10102-24-6**, Lithium silicate ( $\text{Li}_2\text{SiO}_3$ )

RL: DEV (Device component use); **MOA (Modifier or additive use)**; USES (Uses)

(secondary lithium **batteries** with improved **cathodes**)

IT **12031-65-1**, Lithium nickel oxide ( $\text{LiNiO}_2$ ) **136073-31-9**, Lithium nickel oxide ( $\text{LiO}-1.1\text{NiO}_2$ )

RL: DEV (Device component use); USES (Uses)

(secondary lithium **batteries** with improved **cathodes**)

RN **12031-65-1** HCAPLUS

CN Lithium nickel oxide ( $\text{LiNiO}_2$ ) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN **136073-31-9** HCAPLUS

CN Lithium nickel oxide ( $\text{LiO}-1.1\text{NiO}_2$ ) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	1	7440-02-0
Li	0.1 - 1	7439-93-2

IT **7440-21-3**, Silicon, uses

RL: DEV (Device component use); **MOA (Modifier or additive use)**;

USES (Uses)  
 (secondary lithium **batteries** with improved **cathodes**)

RN 7440-21-3 HCAPLUS  
 CN Silicon (CA INDEX NAME)

Si

L95 ANSWER 40 OF 40 HCAPLUS COPYRIGHT 2007 ACS on STN  
 AN 1994:634717 HCAPLUS  
 DN 121:234717  
 TI Lithium **battery**  
 IN Horiba, Tatsuo; Goto, Akihiro; Nishimura, Katsunori; Pponbo, Hidetoshi;  
 Mizumoto, Mamoru  
 PA Hitachi Ltd, Japan  
 SO Jpn. Kokai Tokkyo Koho, 4 pp.  
 CODEN: JKXXAF

DT **Patent**  
 LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06215772	A	19940805	JP 1993-7354	19930120 <--
PRAI	JP 1993-7354		19930120 <--		

AB A Li **battery** has, in addition to a Li or its compound **anode** and an electrolyte consisting of a Li salt and an organic solvent, a **cathode** consisting of a composite oxide of Li and Mn with Li partially replaced with a multivalent metal as pos. active material. The multivalent metal is selected from Mg, Ca, Sr, and Ba. The pos. active material is  $\text{Li}_{1-x}\text{MxMn}_2\text{O}_4$ , where  $x = 0.01-0.3$ . The li **battery** has improved discharge capacity.

IC ICM H01M0004-58

ICS H01M0004-02; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **battery** pos active material

IT **Batteries, secondary**

(alkaline earth metal-doped lithium manganese oxide for pos. active materials of)

IT 7439-95-4, Magnesium, uses 7440-24-6, Strontium, uses 7440-39-3

, Barium, uses 7440-70-2, Calcium, uses

RL: DEV (Device component use); MOA (Modifier or additive use);

USES (Uses)

(doped in lithium manganese oxide for pos. active materials of lithium **batteries**)

IT 39457-42-6, Lithium manganese oxide

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(with doped alkaline earth metals for pos. active materials of lithium **batteries**)

IT 7440-39-3, Barium, uses 7440-70-2, Calcium, uses

RL: DEV (Device component use); MOA (Modifier or additive use);

USES (Uses)

(doped in lithium manganese oxide for pos. active materials of lithium **batteries**)

RN 7440-39-3 HCAPLUS

CN Barium (CA INDEX NAME)

Ba

RN 7440-70-2 HCAPLUS  
 CN Calcium (CA INDEX NAME)

Ca

IT **39457-42-6**, Lithium manganese oxide  
 RL: DEV (Device component use); TEM (Technical or engineered material  
 use); USES (Uses)  
 (with doped alkaline earth metals for pos. active materials of lithium  
**batteries**)  
 RN 39457-42-6 HCAPLUS  
 CN Lithium manganese oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Mn	x	7439-96-5
Li	x	7439-93-2

=&gt; d his

(FILE 'HCAPLUS' ENTERED AT 13:15:02 ON 14 MAY 2007)  
 DEL HIS

L1 3336 SEA FILE=HCAPLUS ABB=ON PLU=ON (L\*\*\* OR L\*\*\* OR L\*\*\* OR L\*\*\* OR  
 L\*\*\* OR

FILE 'REGISTRY' ENTERED AT 13:15:56 ON 14 MAY 2007

FILE 'HCAPLUS' ENTERED AT 13:15:56 ON 14 MAY 2007  
 L2 TRA L1 1- RN : 4319 TERMS

FILE 'REGISTRY' ENTERED AT 13:16:58 ON 14 MAY 2007  
 L3 4319 SEA L2  
 L4 236 S L3 AND (LI/ELS OR ?LITHIUM?/CNS OR 7439-93-2/CRN)  
 L5 225 S L4 AND ((O OR F OR S OR P)/ELS OR (7439-93-2 OR 7704-34-9 OR  
 L6 186 S L5 AND TIS/CI  
 L7 39 S L5 NOT L6  
 L8 115445 S (LI/ELS OR ?LITHIUM?/CNS OR 7439-93-2/CRN)  
 L9 96871 S L8 AND ((O OR F OR S OR P)/ELS OR (7439-93-2 OR 7704-34-9 OR  
 L10 10149 S L9 AND (MN/ELS OR 7439-96-5/CRN OR ?MANGANESE?/CNS)  
 L11 5400 S L10 AND (AL OR CR OR CO OR MG OR LA OR CE OR SR OR V)/ELS  
 L12 5375 S L10 AND (7429-90-5 OR 7440-47-3 OR 7440-48-4 OR 7439-95-4 OR  
 L13 5279 S L10 AND (?ALUMIN? OR ?CHROMIUM? OR ?COBALT? OR ?MAGNESIUM? OR  
 L14 5401 S L11-L13  
 L15 11759 S L8 AND ((NI OR CO)/ELS OR (7440-02-0 OR 7440-48-4)/CRN OR (?  
 L16 11582 S L9 AND L15  
 L17 7027 S L16 AND ((FE OR AL OR CR OR LA OR CE OR SR OR V OR MN OR MG)/  
 L18 6814 S L16 AND (IRON OR ?FERR? OR ?ALUMIN? OR ?CHROMIUM? OR ?LANTHAN  
 L19 7029 S L17,L18  
 L20 118 S L6 AND L10  
 L21 79 S L6 AND L14

L22 122 S L6 AND L16  
 L23 97 S L6 AND L18  
 L24 166 S L20-L23  
 L25 20 S L6 NOT L24

FILE 'HCAPLUS' ENTERED AT 13:43:53 ON 14 MAY 2007

L26 10310 S L24  
 L27 79 S L26 AND L1  
 L28 14 S L27 AND PY<=2000 NOT P/DT  
 L29 32 S L27 AND (PD<=20000525 OR PRD<=20000525 OR AD<=20000525) AND P  
 L30 46 S L28,L29  
 L31 161 S L26 AND SAMSUNG?/PA,CS  
 L32 23 S L31 AND PY<=2000 NOT P/DT  
 L33 55 S L31 AND (PD<=20000525 OR PRD<=20000525 OR AD<=20000525) AND P  
 L34 83 S L30,L32,L33  
 L35 56 S L34 AND H01M/IPC,IC,ICM,ICS  
 E BATTERY/CT  
 L36 59402 S E4+OLD,NT OR E5+OLD,NT OR E6+OLD,NT OR E7 OR E8+OLD,NT  
 E E9+ALL  
 L37 9128 S E2+OLD,NT OR E3+OLD,NT OR E4+OLD,NT  
 E BATTERIES/CT  
 E E3+ALL  
 L38 124260 S E1 OR E2+OLD,NT OR E3+OLD,NT OR E4+OLD,NT OR E5+OLD,NT  
 E ELECTRODE/CT  
 E E91+ALL  
 L39 226461 S E3+OLD,NT  
 L40 79 S L34 AND L36-L39  
 L41 77 S L34 AND ?BATTER?  
 L42 22 S L34 AND ?ELECTROD?  
 L43 78 S L34 AND (?CATHOD? OR ?ANOD?)  
 L44 80 S L35,L40-L43  
 L45 3 S L34 NOT L44

FILE 'REGISTRY' ENTERED AT 13:52:42 ON 14 MAY 2007

L46 5 S 7440-21-3 OR 7440-55-3 OR 7440-56-4 OR 7440-70-2 OR 7440-39-3

FILE 'HCAPLUS' ENTERED AT 13:54:09 ON 14 MAY 2007

FILE 'REGISTRY' ENTERED AT 13:55:01 ON 14 MAY 2007

FILE 'HCAPLUS' ENTERED AT 13:55:30 ON 14 MAY 2007

L47 TRA L31 1- RN : 912 TERMS

FILE 'REGISTRY' ENTERED AT 13:55:34 ON 14 MAY 2007

L48 912 SEA L47  
 L49 220 S L48 AND L10,L14,L16,L19  
 L50 219 S L49 AND TIS/CI  
 L51 1 S L49 NOT L50  
 L52 264 S L50,L24

FILE 'HCAPLUS' ENTERED AT 13:56:54 ON 14 MAY 2007

L53 11466 S L52  
 L54 421 S L53 AND L46  
 L55 71 S L54 AND L46(L)MOA/RL  
 L56 20073 S L10,L14,L16,L19  
 L57 580 S L56 AND L46  
 L58 107 S L56 AND L46(L)MOA/RL  
 L59 107 S L55,L58  
 L60 473 S L54,L57 NOT L59  
 L61 56 S L59,L60 AND PY<=2000 NOT P/DT

L62 135 S L59,L60 AND (PD<=20000525 OR PRD<=20000525 OR AD<=20000525) A  
 L63 191 S L61,L62  
 L64 113 S L63 AND H01M/IPC,IC,ICM,ICS  
 L65 124 S L63 AND L36-L39  
 L66 128 S L63 AND (?BATTER? OR ?ELECTROD? OR ?CATHOD? OR ANOD? OR FUEL  
 L67 129 S L64-L66  
 L68 1 S L67 AND L1  
 L69 2 S L67 AND SAMSUNG?/PA,CS  
 L70 2 S L68,L69  
 L71 43 S L67 AND L46(L)MOA/RL  
 L72 41 S L71 NOT L70  
 SEL HIT RN L70  
 SEL HIT RN L72

FILE 'REGISTRY' ENTERED AT 14:02:24 ON 14 MAY 2007

L73 8 S E1-E8  
 L74 109 S E9-E117  
 L75 104 S L74 NOT L46  
 L76 54 S L75 AND (NI AND CO)/ELS  
 L77 37 S L76 NOT (BI OR NB OR CA OR IN OR Y OR TI OR CU OR SN OR SI O  
 L78 50 S L75 NOT L76  
 L79 43 S L78 NOT ((B OR GE OR ZR OR N)/ELS OR CCS/CI)  
 L80 80 S L77,L79

FILE 'HCAPLUS' ENTERED AT 14:11:01 ON 14 MAY 2007

L81 10141 S L80  
 L82 71 S L81 AND L46(L)MOA/RL  
 L83 2 S L82 AND PY<=2000 NOT P/DT  
 L84 41 S L82 AND (PD<=20000525 OR PRD<=20000525 OR AD<=20000525) AND  
 L85 38 S L84 AND H01M/IPC,IC,ICM,ICS  
 L86 41 S L83,L84 AND L36-L39  
 L87 41 S L86 AND (?BATTER? OR ?ELECTROD? OR ?CATHOD? OR ANOD? OR FUEL  
 L88 43 S L83-L87  
 L89 43 S L70,L88  
 L90 1 S L89 AND L1  
 L91 2 S L89 AND SAMSUNG?/PA,CS  
 L92 3 S L89 AND (KWON? OR KWEON? OR KIM G? OR KIM K? OR JEONG? OR JU  
 L93 3 S L90-L92  
 L94 43 S L89,L93  
 L95 40 S L94 NOT L93  
 L96 3 S L94 NOT L95

FILE 'HCAPLUS' ENTERED AT 14:16:15 ON 14 MAY 2007

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